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## **Draft Economic Analysis of Critical Habitat Designation for the Santa Ana Sucker**

**Prepared for:**

**U.S. Fish and Wildlife Service  
Division of Economics  
Alexandria, Virginia**

**Prepared by:**

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Vancouver, Washington**

**September 23, 2004**

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This report addresses the economic effects associated with the designation of critical habitat for the Santa Ana sucker (*Catostomus santaanae*, hereafter “SAS”). The U.S. Fish and Wildlife Service (hereafter “Service”), in compliance with a court order, published a final rule designating critical habitat for the SAS on February 26, 2004.<sup>1</sup> The final rule, which was published without prior public notice and review, became effective immediately. To ensure adequate public review, a proposed rule was published in the Federal Register concurrent with the final rule.<sup>2</sup> The purpose of this report is to identify and estimate the economic effects associated with the designation of critical habitat for the SAS. The analysis attempts to quantify the economic costs of the critical habitat designation (CHD), as well as any protective measures taken that aid conservation of the species within the specific areas designated as critical and essential habitat. Economic costs are measured here in terms of the impacts of the listing and the CHD on the efficient use of society’s resources, as well as how those costs are distributed across segments of society. This analysis is intended to assist the Secretary in determining whether the benefits of excluding particular areas from the designation (avoided costs) outweigh the biological benefits of including those areas in a revised final designation.

On January 26, 1999, the Service proposed threatened status for the SAS under the Endangered Species Act (ESA) within its native historic range in the Los Angeles, San Gabriel, and Santa Ana River systems.<sup>3</sup> Following an extended comment period, the Service published the final rule in the April 12, 2000, edition of the Federal Register.<sup>4</sup>

### DESIGNATED CRITICAL HABITAT

Portions of three river basins representing the native range of the SAS have been designated as critical habitat. These areas were designated because they contain those physical and biological features (“primary constituent elements”) essential to the conservation of the species and which may require special management considerations of protection. These areas are displayed in the Map Attachment to this report.

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<sup>1</sup> U.S. Fish and Wildlife Service, February 26, 2004, “Final Rule to Designate Critical Habitat for the Santa Ana Sucker (*Catostomus santaanae*),” *Federal Register*, Vol. 69, No. 38, pp. 8839-8861.

<sup>2</sup> U.S. Fish and Wildlife Service, February 26, 2004, “Proposed Rule to Designate Critical Habitat for the Santa Ana Sucker (*Catostomus santaanae*),” *Federal Register*, Vol. 69, No. 38, pp. 8911-8915.

<sup>3</sup> U.S. Fish and Wildlife Service, January 26, 1999, “Proposed Threatened Status for the Santa Ana Sucker, Proposed Rule,” *Federal Register*, Vol. 64, No. 16, pp. 3915-3923.

<sup>4</sup> U.S. Fish and Wildlife Service, April 12, 2000, “Threatened Status for the Santa Ana Sucker, Final Rule,” *Federal Register*, Vol. 65, No. 71, pp. 19686-19698.

Two areas comprise the Santa Ana River Unit: Unit 1A, Northern Prado Basin, and Unit 1B, Santa Ana Wash. Unit 1A, the Northern Prado Basin, is located in San Bernardino County near the Riverside County boundary and south of the City of Chino. The CHD includes both Mill Creek and Chino Creek, both of which drain to the Prado Flood Control Basin located to the south (and outside the critical habitat), and eventually the nearby Santa Ana River. Unit 1B, the Santa Ana Wash, stretches from the upper watershed of Mill Creek, in the San Bernardino National Forest, west to the broad Santa Ana River floodplain area north of the City of Redlands, the lower portion of City Creek wash area, and further west to the narrower river channel as it flows south of the cities of San Bernardino and Colton. The terrain is forested with steep canyons in the mountain portion, surrounded by orange groves and new residential homes in the central wash, to more established commercial and residential areas in the west.

Unit 2, San Gabriel River, is located entirely within the Angeles National Forest in Los Angeles County. The unit contains large portions of the West Fork, North Fork, and East Fork of the San Gabriel River, plus most of Cattle Canyon Creek, a tributary to the East Fork, as well as Bear Creek, and Big Mermaids Canyon Creek. The north end of San Gabriel Reservoir, at the confluence of the West and East Forks, is included.

Unit 3, Big Tujunga Creek, is a relatively confined stretch of river between Big Tujunga Dam and Hansen Dam, including Hansen Lake, and most of Little Tujunga Creek, Delta Canyon Creek, Gold Canyon Creek, and Stone Canyon Creek. Approximately the eastern third is located in Angeles National Forest, and the western portion within the corporate boundary of the City of Los Angeles.

## **SUMMARY OF RESULTS**

This section addresses the economic effects of conservation activities attributable to both the listing of the SAS under the ESA and designation of critical habitat. The analysis measures effects on residential and commercial development, commercial mining, water treatment facilities, the Santa Ana River Interceptor (SARI) Line, water supply, recreational mining, off-highway vehicle (OHV) recreation, transportation, and hydroelectric and flood control dams.

Table ES-1 provides a summary of the economic impacts due to SAS conservation measures in critical habitat for each of the activities analyzed in this analysis. Retrospective costs total \$4.2 million, with transportation bearing \$3.4 million of the costs. The remainder of retrospective costs were split among OHV recreation, flood control agencies, and Federal agencies. Total prospective costs are \$30.5 million assuming a three percent discount rate and \$21.8 million with a seven percent discount rate. Annual prospective costs are estimated to be \$2.0 million. Costs associated with transportation contribute 49 percent of the annual costs and overall prospective costs. Other leading activities include water supply, flood control agencies, and residential and commercial development.

**Table ES-1**  
**Summary of Economic Effects Associated with Santa Ana Sucker**  
**Conservation Measures in Critical Habitat**

Category of Impact	Retrospective 1999-2004 (Total)	Prospective 2004-2024 (Total)		Prospective Annual
		3%	7%	
Residential/Commercial Development	\$0	\$2,169,000	\$1,656,000	\$138,000
SAS Conservation Program Contributions	\$0	\$0	\$0	\$0
Commercial Mining	\$0	\$0	\$0	\$0
Water Treatment Facilities	\$0	\$595,000	\$424,000	\$40,000
Santa Ana River Interceptor (SARI) Line	\$0	\$0	\$0	\$0
Water Supply	\$0	\$7,097,000	\$5,053,000	\$477,000
Flood Control Agencies	\$250,000	\$2,232,000	\$1,589,000	\$150,000
Recreational Mining	\$0	\$0	\$0	\$0
Off-Highway Vehicle (OHV) Recreation	\$378,000	\$1,336,000	\$951,000	\$90,000
Other Recreation	\$0	\$0	\$0	\$0
Transportation	\$3,430,000	\$14,890,000	\$10,603,000	\$1,001,000
Dams - Flood Control	\$0	\$1,526,000	\$1,087,000	\$103,000
Dams - Hydroelectric	\$0	\$0	\$0	\$0
Riverside MSHCP Preparation	\$0	\$0	\$0	\$0
Federal Agencies	\$101,000	\$680,000	\$484,000	\$44,000
<b>Total Estimated Costs to CHD</b>	<b>\$4,159,000</b>	<b>\$30,525,000</b>	<b>\$21,847,000</b>	<b>\$2,043,000</b>

Note: Numbers may not sum due to rounding.

Table ES-2 provides a summary of the economic impacts due to SAS conservation measures in the excluded lands (EL) for each of the activities considered in this analysis. Retrospective costs amount to \$1.6 million, with the SAS Conservation Program contributions, costs for developing the Western Riverside MSHCP, and costs on water supply as the largest components. Prospective costs are presented in the table as a range because of uncertainty about which of the SARI Line improvement alternatives will be selected. Total prospective costs are \$10.9 to \$15.3 million assuming a three percent discount rate and \$7.9 to \$11.0 million with a seven percent discount rate. Annual prospective costs are estimated to be \$0.7 to \$1.0 million. Costs associated with SARI Line improvements contribute the largest share at 29 percent of the annual costs and overall prospective costs. Other leading activities include flood control agencies, the SAS Conservation Program, residential and commercial development, flood control dams, and water supply.

**Table ES-2**  
**Summary of Economic Effects Associated with Santa Ana Sucker**  
**Conservation Measures in Excluded Lands**

Category of Impact	Retrospective 1999-2004 (Total)	Prospective 2004-2024 (Total)		Prospective Annual
		3%	7%	
Residential/Commercial Development	\$0	\$1,717,000	\$1,305,000	\$107,000
SAS Conservation Program Contribution	\$520,000	\$1,934,000	\$1,377,000	\$130,000
Commercial Mining	\$0	\$0	\$0	\$0
Water Treatment Facilities	\$27,000	\$827,000	\$589,000	\$56,000
Santa Ana River Interceptor (SARI) Line	\$7,000	\$0 - \$4,389,000	\$0 - \$3,125,000	\$0 - \$295,000
Water Supply	\$309,000	\$1,337,000	\$952,000	\$90,000
Flood Control Agencies	\$89,000	\$2,739,000	\$1,951,000	\$184,000
Recreational Mining	\$0	\$0	\$0	\$0
Off-Highway Vehicle (OHV) Recreation	\$0	\$0	\$0	\$0
Other Recreation	\$0	\$0	\$0	\$0
Transportation	\$0	\$533,000	\$380,000	\$36,000
Dams - Flood Control	\$100,000	\$1,659,000	\$1,182,000	\$112,000
Dams - Hydroelectric	\$0	\$0	\$0	\$0
Riverside MSHCP Preparation	\$367,000	\$0	\$0	\$0
Federal Agencies	\$199,000	\$170,000	\$121,000	\$11,000
<b>Total Estimated Costs to EL</b>	<b>\$1,618,000</b>	<b>\$10,916,000 - \$15,305,000</b>	<b>\$7,857,000 - \$10,982,000</b>	<b>\$726,000 - \$1,021,000</b>

Note: Numbers may not sum due to rounding.

Table ES-3 provides a combined summary of Tables ES-1 and ES-2, and thus reflects the economic effects associated with SAS conservation measures in all essential habitat. Total retrospective costs are \$5.8 million. Total prospective cost with a three percent discount rate are \$41.4 to \$45.8 million, and with a seven percent discount rate is \$29.7 to \$32.8 million, depending upon the SARI Line improvement alternative.

**Table ES-3**  
**Summary of Economic Effects Associated with Santa Ana Sucker**  
**Conservation Measures in All Essential Habitat**

Category of Impact	Retrospective 1999-2004 (Total)	Prospective 2004-2024 (Total)		Prospective Annual
		3%	7%	
Total Estimated Costs to Essential Habitat	\$5,777,000	\$41,441,000 - \$45,830,000	\$29,704,000 - \$32,829,000	\$2,769,000 - \$3,064,000

#### RESULTS BY CRITICAL HABITAT UNIT

Table ES-4 provides a summary of the total costs attributable to each SAS habitat unit. The costs include all of the categories of impacts provided in the tables above. Retrospective costs range from \$0 in Unit 1A, Northern Prado Basin, to \$3.4 million in Unit 1B, Santa Ana Wash. Unit 1B, Santa Ana Wash, has incurred the highest retrospective costs due to SAS listing primarily stemming from transportation projects within the unit that have required SAS conservation measures. Within the CHD, total prospective costs are also highest in Unit 1B, Santa Ana Wash (\$15.6 million using a three percent discount rate and \$11.2 million using seven percent), and the lowest in Unit 1A, Northern Prado Basin (\$1.1 million using a three percent discount rate and \$0.8 million using a seven percent discount rate). All EL are estimated to incur prospective costs ranging from \$10.9 to \$15.3 million, or \$7.9 to \$11.0 million using three and seven percent discount rates, respectively. The relatively high costs and range of costs in the EL are primarily attributable to the SARI Line and flood control activities. Estimated annual costs within the CHD range from \$72,000 in Unit 1A, Northern Prado Basin, to \$1.0 million in Unit 1B, Santa Ana Wash. Annual costs to EL are estimated in the range of \$725,000 to \$1.02 million.

**Table ES-4**  
**Potential Total Economic Impacts by SAS Habitat Unit**

Habitat Unit	Retrospective (Total)	Prospective (Total)		Prospective (Annual)
		3%	7%	
Unit 1A – Northern Prado Basin	\$0	\$1,109,000	\$821,000	\$72,000
Unit 1B – Santa Ana Wash	\$3,449,000	\$15,620,000	\$11,188,000	\$1,045,000
Unit 2 – San Gabriel River	\$681,000	\$5,176,000	\$3,685,000	\$348,000
Unit 3 – Big Tujunga Creek	\$29,000	\$8,620,000	\$6,153,000	\$578,000
<b>Total CHD</b>	<b>\$4,159,000</b>	<b>\$30,525,000</b>	<b>\$21,848,000</b>	<b>\$2,043,000</b>
Excluded Land (Essential Habitat)	\$1,618,000	\$10,915,000 - \$15,304,000	\$7,857,000 - \$10,982,000	\$725,000 - \$1,020,000

Note: Numbers may not sum due to rounding.

## SUMMARY OF RESULTS BY MAJOR ACTIVITY

### TRANSPORTATION COSTS

Costs associated with transportation contribute 49 percent of overall prospective costs in the critical habitat. Transportation costs are a smaller share of the prospective costs in the EL. As discussed in Section 6.5, transportation projects requiring conservation measures may include the widening of a road, the reconstruction of a bridge, or maintenance of existing infrastructure. The consultation history reveals that the Service has consulted on four transportation-related projects, all of which involved bridge reconstruction and maintenance. In addition, the majority of U.S. Army Corps of Engineers (USACE) permits issued within SAS habitat have involved bridge projects.

Transportation projects can produce environmental impacts that may affect SAS habitat directly (i.e., riparian destruction during a bridge replacement) or indirectly (i.e., increased erosion from a road widening project). Costs associated with SAS conservation measures are based upon the costs of specific construction project modifications designed to reduce habitat impacts, such as sediment control, spill prevention, monitoring, SAS relocation, and other such modifications.

### RESIDENTIAL AND COMMERCIAL DEVELOPMENT

As discussed in Section 2.2.2.1, the impact of conservation measures on residential and commercial development may include:

- Cost of project modifications and improvements (e.g., additional requirements for sedimentation reduction or stormwater management, or mitigation activities); and
- Cost of development restrictions (e.g., prohibition on development in riparian areas).

The costs to residential and commercial development arising from SAS conservation measures are estimated based on the assumption that development is allowed in the designated areas if appropriate mitigation activities are taken. The mitigation activities for development include habitat restoration, land set-aside, and off-site conservation. These costs are assumed to be paid for by developers or landowners. Taxpayers in respective counties would pay for associated agency management and monitoring costs.

## OTHER COSTS

Other activities that dominate among costs include water supply (\$7.1 million in the critical habitat), the SARI Line (\$4.4 million in the excluded lands), and flood control agencies (\$2.7 million in the excluded lands and \$2.2 in the critical habitat). SAS conservation measures may affect water supply facilities and agencies through reductions in the volume of water used for aquifer storage and water recovery programs. The SARI Line is a structural system designed to transport brine and non-reclaimable wastewater from the upper Santa Ana River basin to the ocean; one major structural enhancement that may be required is fish passage and related conservation measures for the SAS. If the SARI Line is moved to a location outside of the essential habitat, costs associated with fish passage and conservation measures for the SAS would be avoided.

The SAS Conservation Program includes participants from eight agencies that do work in or around the Santa Ana River, and are concerned about the recovery of the SAS. Yearly contributions from each agency are used to promote survival and recovery of the SAS. Three flood control districts (Riverside County Flood Control and Water Conservation District, Orange County Flood Control District, and San Bernardino County Flood Control District) are involved with a SAS Conservation Program in order to cover activities involving maintenance of flood control structures, flood capacity, and low flow channels within Excluded Lands in the Santa Ana River. These flood control activities are performed to ensure the structural integrity of levees that protect industrial, commercial, and residential properties from flood damage.

This report addresses the economic effects of conservation activities associated with the listing and designation of critical habitat for the Santa Ana sucker (*Catostomus santaanae*). The analysis attempts to quantify the economic effects of the designation of critical habitat, as well as the economic effects of the protective measures taken as a result of the listing of the SAS or other Federal, State, and local laws that also aid habitat conservation in the areas designated as critical habitat. Because all SAS-related species and habitat protection efforts likely contribute to the efficacy of the SAS critical habitat designation (CHD) efforts, the impacts of these actions may be considered relevant for understanding the full impact of CHD. Costs are examined that (a) have been incurred since the date the species was listed and through the final designation of critical habitat (pre-designation costs), and (b) are forecast to occur after the final designation (post-designation costs).

This analysis is intended to assist the Secretary in determining whether the benefits (avoided costs) of excluding particular areas from a revised final designation outweigh the biological benefits of including those areas in a revised final designation.<sup>5</sup> In addition, this information allows the Service to address the requirements of Executive Orders 12866 and 13211, and the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA).<sup>6</sup> This report also complies with direction from the U.S. 10<sup>th</sup> Circuit Court of Appeals that “co-extensive” effects should be included in the economic analysis to inform decision-makers regarding which areas to designate as critical habitat.<sup>7</sup>

This section provides the general analytic approach to estimating economic effects, including discussion of both efficiency and distributional effects. Next, it discusses the scope of the analysis, including the link between existing and critical habitat-related protection efforts and economic impacts. Then, it describes the information sources employed to conduct this analysis. Finally, it describes the background of the listing and designation of critical habitat for the SAS.

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<sup>5</sup> 16 U.S.C. § 1533(b)(2).

<sup>6</sup> Executive Order 12866, September 30, 1993, “Regulatory Planning and Review;” Executive Order 13211, May 18, 2001, “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use;” 5 U.S.C. § 601 *et seq*; and Pub. Law No. 104-121.

<sup>7</sup> In 2001, the U.S. 10th Circuit Court of Appeals instructed the Service to conduct a full analysis of all of the economic impacts of proposed CHD, regardless of whether those impacts are attributable co-extensively to other causes (*New Mexico Cattle Growers Ass’n vs. U.S.F.W.S.*, 248 F.3d 1277 (10th Cir. 2001)).

## 1.1 APPROACH TO ESTIMATING ECONOMIC EFFECTS

This economic analysis considers both the economic efficiency and distributional effects that may result from species and habitat protection. Economic efficiency effects generally reflect “opportunity costs” associated with the commitment of resources required to accomplish species and habitat conservation. For example, if activities on private lands are limited as a result of the designation or the presence of the species, and thus the market value of the land is reduced, this reduction in value represents one measure of opportunity cost or change in economic efficiency. Similarly, the costs incurred by a Federal action agency to consult with the Service under section 7 represent opportunity costs of habitat conservation.

This analysis also addresses the distribution of impacts associated with the designation, including an assessment of any local or regional impacts of habitat conservation and the potential effects of conservation activities on small entities, the energy industry, or governments. This information may be used by decision-makers to assess whether the effects of the designation unduly burdens a particular group or economic sector. For example, while habitat conservation activities may have a small impact relative to the national economy, individuals employed in a particular sector of the regional economy may experience a significant level of impact. The difference between economic efficiency effects and distributional effects, as well as their application in this analysis, are discussed in greater detail below.

### 1.1.1 EFFICIENCY EFFECTS

At the guidance of the Office of Management and Budget (OMB) and in compliance with Executive Order 12866 “Regulatory Planning and Review,” Federal agencies measure changes in economic efficiency in order to discern the implications on a societal level of a regulatory action. For regulations specific to the conservation of the SAS, efficiency effects represent the opportunity cost of resources used, or benefits foregone, by society as a result of the regulations. Economists generally characterize opportunity costs in terms of changes in producer and consumer surplus in affected markets.<sup>8</sup>

In some instances, compliance costs may provide a reasonable approximation for the efficiency effects associated with a regulatory action. For example, a landowner or manager may enter into a consultation with the Service to ensure that a particular activity will not adversely modify critical habitat. The effort required for the consultation is an economic opportunity cost, because the landowner or manager’s time and effort would have been spent in an alternative activity had his or her land not been designated critical habitat. In the case that compliance activity is not expected to significantly affect markets – that is, not result in a shift in the quantity of a good or service provided at a given price, or in the quantity of a good

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<sup>8</sup> For additional information on the definition of “surplus” and an explanation of consumer and producer surplus in the context of regulatory analysis, see Gramlich, Edward M., 1990, *A Guide to Benefit-Cost Analysis* (2<sup>nd</sup> Ed.), Prospect Heights, Illinois: Waveland Press, Inc.; and U.S. Environmental Protection Agency, September 2000, *Guidelines for Preparing Economic Analyses*, EPA 240-R-00-003, <http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/Guidelines.html>.

or service demanded given a change in price – the measurement of compliance costs provides a reasonable estimate of the change in economic efficiency.

Where habitat protection measures are expected to significantly impact a market, it may be necessary to estimate changes in producer and consumer surpluses. For example, a designation that precludes the development of large areas of land may shift the price and quantity of housing supplied in a region. In this case, changes in economic efficiency (i.e., social welfare) can be measured by considering changes in producer and consumer surplus in the real estate market.

This analysis begins by measuring costs associated with measures taken to protect species and habitat. As noted above, in some cases, compliance costs can provide a reasonable estimate of changes in economic efficiency. In the case of the SAS, compliance costs are in fact expected to represent a reasonable estimate of efficiency effects, and thus impacts on consumer and producer surpluses in affected markets are considered but not estimated.

### 1.1.2 DISTRIBUTIONAL AND REGIONAL ECONOMIC EFFECTS

Measurements of changes in economic efficiency focus on the net impact of conservation activities, without consideration of how certain economic sectors or groups of people are affected. Thus, a discussion of efficiency effects alone may miss important distributional considerations. OMB encourages Federal agencies to consider distributional effects separately from efficiency effects.<sup>9</sup> This analysis considers several types of distributional effects, including impacts on small entities; impacts on energy supply, distribution, and use; and regional economic impacts. It is important to note that these are fundamentally different measures of economic impact than efficiency effects, and thus cannot be added to or compared with estimates of changes in economic efficiency.

#### 1.1.2.1 Impacts on Small Entities and Energy Supply, Distribution, and Use

This analysis considers how small entities, including small businesses, organizations, and governments, as defined by the RFA, may be affected by future SAS conservation measures.<sup>10</sup> In addition, in response to Executive Order 13211 “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use,” this analysis considers the impacts of conservation measures on the energy industry and its customers.<sup>11</sup> While small business impacts are discussed, significant impacts on the energy sector are not expected. See Appendix A for an analysis of impacts to small businesses and the energy industry.

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<sup>9</sup> U.S. Office of Management and Budget, September 17, 2003, “Circular A-4,” <http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf>.

<sup>10</sup> 5 U.S.C. § 601 *et seq.*

<sup>11</sup> Executive Order 13211, May 18, 2001, “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use.”

### 1.1.2.2 Regional Economic Effects

Regional economic impact analysis can provide an assessment of the potential localized effects of conservation measures. Specifically, regional economic impact analysis produces a quantitative estimate of the potential magnitude of the initial change in the regional economy resulting from a regulatory action. Regional economic impacts are commonly measured using input/output models. These models rely on multipliers that represent the relationship between a change in one sector of the economy (e.g., expenditures by recreationists) and the effect of that change on economic output, income, or employment in other local industries (e.g., suppliers of goods and services to recreationists). These economic data provide a quantitative estimate of the magnitude of shifts of jobs and revenues in the local economy.

The use of regional input/output models in an analysis of the impacts of species and habitat conservation efforts can overstate the long-term impacts of a regulatory change. Most importantly, these models provide a static view of the economy of a region. That is, they measure the initial impact of a regulatory change on an economy but do not consider long-term adjustments that the economy will make in response to this change. For example, these models provide estimates of the number of jobs lost as a result of a regulatory change, but do not consider re-employment of these individuals over time or other adaptive responses by affected businesses. In addition, the flow of goods and services across the regional boundaries defined in the model may change as a result of the regulation, compensating for a potential decrease in economic activity within the region.

Despite these and other limitations, in certain circumstances regional economic impact analysis may provide useful information about the scale and scope of localized impacts. It is important to remember that measures of regional economic effects generally reflect shifts in resource use rather than efficiency losses. Thus, these types of distributional effects are reported separately from efficiency effects (i.e., not summed). In addition, measures of regional economic impact cannot be compared with estimates of efficiency effects, but should be considered as distinct measures of impact.

## 1.2 SCOPE OF THE ANALYSIS

This analysis attempts to quantify the economic effects of the designation of critical habitat, *as well as any protective measures taken as a result of the listing or other Federal, State, and local laws that aid habitat conservation in the areas designated as critical habitat*. Habitat protection efforts undertaken to meet the requirements of other Federal, State, or local agencies can assist the Service in achieving its goals as set out in the Act. In certain cases, other government entities may work cooperatively with the Service to address natural resource management issues, thereby expediting the regulatory process for project proponents. Because habitat protection efforts affording protection to the SAS likely contribute to the efficacy of the CHD efforts, the impacts of these actions are considered relevant for understanding the full impact of CHD.

The following items are included in the economic analysis:

- Consistent with recent court rulings, the analysis includes impacts that occur co-extensively with the listing resulting from sections 4, 7, 9, or 10 of the ESA. Enforcement actions taken in response to violations of the ESA, however, are not included.
- The analysis considers conservation and protection measures for the SAS. No distinction is made in the main report between impacts that occur due to listing and those that result from CHD.
- Both retrospective and prospective costs are considered. Retrospective costs include those that have accrued since the time that the SAS listing was proposed but prior to designation of critical habitat. Prospective effects include likely future costs associated with SAS conservation measures from February 26, 2004, to the year 2024.
- The geographic scope of the analysis reflects the distinct areas inhabited by the SAS that are currently designated as essential habitat, including both critical habitat and excluded lands: portions of the Santa Ana River; San Gabriel River; and Big Tujunga Creek, a tributary to the Los Angeles River; all located within four counties of Southern California. The four counties are Los Angeles, Orange, Riverside, and San Bernardino.
- The geographic unit of analysis is the individual stream reach within each of the three basins. In some circumstances, the costs may apply to small but clearly defined areas within each stream reach.
- The localized economic efficiency effects reflect the aquatic reaches identified as critical habitat. However, activities occurring in adjacent land or beyond of the boundaries of the critical habitat with the potential to affect critical habitat, such as stream water quality, are also considered when appropriate. Thus, all relevant costs in adjacent areas may be included.
- This analysis utilizes a “with” and “without” framework, and emphasizes those effects that are determined to be attributable to SAS conservation activities. Impacts that would have occurred without the SAS listing and CHD are evaluated on a case-by-case basis to determine if they should be assigned, in part, to conservation measures for the SAS.
- The period of analysis and discounting is guided by the availability of information concerning the start date and duration of the activity. Each potential cost component is examined over the time period that is appropriate for that specific activity or investment. Some of these are costs that are incurred one time only, while others are recurring. These costs are presented both as net present values and annualized costs, using three and seven percent discount rates.

### 1.2.1 SECTIONS OF THE ESA RELEVANT TO ECONOMIC ANALYSIS

The analysis begins by estimating retrospective costs incurred from the time that the SAS was first proposed for listing. It focuses on activities that are influenced by the Service through sections 4, 7, 9,

and 10 of the ESA. It then looks at activities likely to occur in the foreseeable future, and quantifies the effects that sections 4, 7, 9, and 10 of the ESA may have on those activities.

Section 4 of the ESA focuses on the listing and recovery of endangered and threatened species, as well as the CHD. Pursuant to this section, the Secretary is required to determine if a species warrants listing as endangered or threatened “solely on the basis of the best scientific and commercial data available.”<sup>12</sup> Under section 4(d) of the ESA, the Service may write regulations to provide for the conservation of threatened species. The implementation of these regulations may have economic impacts on resource managers, landowners, and other relevant parties. However, there is no 4(d) rule in place for the SAS, and thus 4(d) issues are not relevant to this analysis.

Protections afforded to threatened and endangered species and their designated critical habitat are described in sections 7, 9, and 10 of the ESA. The economic effects of these protections are considered in this analysis:

- Section 7 of the ESA requires Federal agencies to consult with the Service to ensure that any action they authorize, fund, or carry out will not jeopardize the continued existence of any endangered or threatened species, or result in the destruction or adverse modification of designated critical habitat. The administrative costs of these consultations, along with the costs of project modifications resulting from these consultations, represent compliance costs associated with the listing of the species and CHD.
- Section 9 defines the actions that are prohibited by the ESA, and in particular, prohibits the “take” of a listed species. The term “take” means to “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.”<sup>13</sup> “Harm” in this passage is defined as “an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering.”<sup>14</sup> The economic impacts associated with this section manifest themselves in sections 7 and 10.
- Section 10 of the ESA, in part, allows non-Federal entities (e.g., a landowner or local government) to undertake activities that may result in take of listed species. Such entities may develop and implement a Habitat Conservation Plan (HCP) for the species that meets the conditions for issuance of an incidental take permit in connection with development and management of a property.<sup>15</sup> The requirements posed by the HCP may have economic impacts

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<sup>12</sup> 16 U.S.C. § 1533.

<sup>13</sup> 16 U.S.C. § 1532.

<sup>14</sup> U.S. Fish and Wildlife Service, February 2004, “ESA Basics,” [http://endangered.fws.gov/pubs/esa\\_basics.pdf](http://endangered.fws.gov/pubs/esa_basics.pdf).

<sup>15</sup> Ibid.

associated with the goal of ensuring that the effects of incidental take are adequately minimized and mitigated. In the case of the SAS, essential habitat within Riverside County is covered by a multi-species HCP (see Section 4.3.2). A significant portion of the land in the three basins that are the subject of this analysis encompassing the proposed CHD is Federally owned, and Federal agencies do not develop HCPs. Federal entities obtain permission for incidental take through the section 7 consultation process.

### 1.2.2 OTHER RELEVANT PROTECTION EFFORTS

The protection of listed species and habitat is not limited to the ESA. Other Federal agencies, as well as State and local governments, may also seek to protect the natural resources under their jurisdiction.<sup>16</sup> In addition, under certain circumstances, the CHD may provide new information to a community about the sensitive ecological nature of a geographic region, potentially triggering additional economic impacts under other State or local laws. In cases where these costs would not have been triggered “but for” the designation of critical habitat, they are included in this economic analysis.

### 1.2.3 ADDITIONAL ANALYTIC CONSIDERATIONS

Previous economic impact analyses prepared to support critical habitat decisions have considered other types of economic impacts related to conservation measures associated with CHD, including time delay, regulatory uncertainty, and stigma impacts. This analysis considers these types of economic impacts and has determined that the CHD for the SAS is unlikely to have economic impacts of this nature.

### 1.2.4 BENEFITS

The published economics literature has documented that real social welfare benefits can result from conservation and recovery of endangered and threatened species. Such benefits have also been ascribed to preservation of open space and biodiversity, both of which can be associated with species conservation, but which are not the purpose of critical habitat. Likewise, regional economies and communities can benefit from the preservation of healthy populations of endangered and threatened species, and the habitat on which these species depend.

In Executive Order 12866, OMB directs Federal agencies to provide an assessment of costs and benefits of proposed regulatory actions.<sup>17</sup> In its guidance for implementing Executive Order 12866, however,

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<sup>16</sup> For example, the Sikes Act Improvement Act (Sikes Act) of 1997 requires Department of Defense (DoD) military installations to develop Integrated Natural Resources Management Plans (INRMPs) that provide for the conservation, protection, and management of wildlife resources (16 U.S.C. 670a - 670o). These plans must integrate natural resource management with the other activities, such as training exercises, taking place at the facility.

<sup>17</sup> Executive Order 12866, September 30, 1993, “Regulatory Planning and Review.”

OMB acknowledges that often, it may not be feasible to monetize, or even quantify, the benefits of environmental regulations.<sup>18</sup> Where benefits cannot be quantified, OMB directs agencies to describe the benefits of a proposed regulation qualitatively. *Given the limitations associated with estimating the benefits of critical habitat designation for the SAS, the Service believes that the benefits of critical habitat designation are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.* Thus, this report does not provide a monetary measure of the economic benefits of species preservation. However, the analyses reported here do recognize the potential positive values that may be associated with CHD; correct economic assessment of the costs of a CHD should include all identifiable and measurable costs, including the negative costs.

### **1.3 ANALYTIC TIME FRAME**

The analysis examines activities taking place both within and adjacent to the CHD and excluded lands, and considers activities that have occurred since the listing (1999) and prior to designation (2004), as well as activities anticipated to occur after designation. The analysis estimates impacts based on activities that are “reasonably foreseeable,” including, but not limited to, activities that are currently authorized, permitted, or funded, or for which proposed plans are currently available to the public. The analysis estimates economic impacts to activities from 1999 (year of the proposed rule for listing) to 2024 (20 years from the year of final CHD).

### **1.4 INFORMATION SOURCES**

The analysis contained in this report is based on information collected from a wide range of sources. Service personnel provided information on past SAS section 7 consultation project modification and terms and conditions, as well as copies of formal SAS consultation documents. The Service also supplied maps delineating the designated critical habitat by unit, overlaid on the respective U.S. Geological Survey (USGS) maps. The Service provided the output of requested GIS analysis for information on land ownership by critical habitat unit, as well as management status for several of the action agencies, including the U.S. Forest Service (USFS). The specific sources used to address the effects of the CHD are identified within each section. A full list of information sources is provided in the reference section at the end of this report.

### **1.5 BACKGROUND OF THE SANTA ANA SUCKER LISTING**

The Service listed the SAS as a threatened species under the Endangered Species Act of 1973, as amended (ESA). The Service first received a petition for listing on September 6, 1994, submitted by the

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<sup>18</sup> U.S. Office of Management and Budget, February 3, 2003, “Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations; Notice,” *Federal Register*, Vol. 68, No. 22, p. 5492; and U.S. Office of Management and Budget, March 22, 2000, “Appendix 4: Guidelines to Standardize Measure of Costs and Benefits and the Format of Accounting Statements,” in *Report to Congress on the Costs and Benefits of Federal Regulations*.

Sierra Club Legal Defense Fund, Inc. On July 9, 1996, the Service published a petition finding that a listing may be warranted,<sup>19</sup> and in November of that year initiated a status review for the SAS.<sup>20</sup> Although in 1997 the Service concluded that listing was warranted, action was precluded because of other, higher-priority listing activities.<sup>21</sup>

On January 26, 1999, the Service proposed threatened status for the SAS under the ESA within its native historic range in the Los Angeles, San Gabriel, and Santa Ana River systems.<sup>22</sup> Following an extended comment period, the Service published the final rule listing the SAS as threatened in the April 12, 2000, edition of the Federal Register.<sup>23</sup> In compliance with a court order, the Service published a final rule designating critical habitat for the SAS on February 26, 2004.<sup>24</sup> The final rule, which was published without prior public notice and review, became effective immediately. To ensure adequate public review, a proposed rule was published in the Federal Register concurrent with the final rule.<sup>25</sup> A recovery plan has not yet been developed, but factors have been identified affecting the survival of the species, including: effects of urbanization resulting in extreme alterations in stream channels, introduced predators and competitors, recreational mining, recreational activities on forest lands causing destruction of streambank vegetation and water quality degradation, and other point and nonpoint source pollution.<sup>26</sup> The identification of these factors indicates that a number of potential actions may be required for recovery, and such actions are expected to impose economic costs.

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<sup>19</sup> U.S. Fish and Wildlife Service, July 9, 1996, “90-day Finding on a Petition to List the Santa Ana Speckled Dace, Santa Ana Sucker, and the Shay Creek Threespine Stickleback as Endangered,” *Federal Register*, Vol. 61, No. 132, pp. 36021-36023.

<sup>20</sup> U.S. Fish and Wildlife Service, November 26, 1996, “Notice of Initiation of 12-month Status Review for Petition to List the Santa Ana Sucker as Endangered,” *Federal Register*, Vol. 61, No. 229, pp. 60073-60074.

<sup>21</sup> U.S. Fish and Wildlife Service, April 3, 1997, “12-Month Finding for a Petition To List the Santa Ana Sucker as Endangered,” *Federal Register*, Vol. 62, No. 64, pp. 15872-15873.

<sup>22</sup> U.S. Fish and Wildlife Service, January 26, 1999, “Proposed Threatened Status for the Santa Ana Sucker, Proposed Rule,” *Federal Register*, Vol. 64, No. 16, pp. 3915-3923.

<sup>23</sup> U.S. Fish and Wildlife Service, April 12, 2000, “Threatened Status for the Santa Ana Sucker, Final Rule,” *Federal Register*, Vol. 65, No. 71, pp. 19686-19698.

<sup>24</sup> U.S. Fish and Wildlife Service, February 26, 2004, “Final Rule to Designate Critical Habitat for the Santa Ana Sucker (*Catostomus santaanae*),” *Federal Register*, Vol. 69, No. 38, pp. 8839-8861.

<sup>25</sup> U.S. Fish and Wildlife Service, February 26, 2004, “Proposed Rule to Designate Critical Habitat for the Santa Ana Sucker (*Catostomus santaanae*),” *Federal Register*, Vol. 69, No. 38, pp. 8911-8915.

<sup>26</sup> U.S. Fish and Wildlife Service, April 12, 2000, “Threatened Status for the Santa Ana Sucker, Final Rule,” *Federal Register*, Vol. 65, No. 71, pp. 19692-19693.

## 1.6 BACKGROUND OF THE SANTA ANA SUCKER CRITICAL HABITAT DESIGNATION

As noted earlier, the Service first received a petition from the Sierra Club Legal Defense Fund on behalf of seven groups to list the SAS in 1994. In July 1996, the Service published a notice that a listing may be warranted, but on April 3, 1997, said that although listing is warranted, it is precluded by other higher priorities. This action by the Service prompted a lawsuit filed by the petitioners, California Trout, American Fisheries Society, Center for Biological Diversity, and Friends of the River, challenging the Service decision that listing is “warranted but precluded.” Though a joint stipulation agreement, the Service agreed to make a listing decision, which led to a January 26, 1999, proposed rule to list the SAS as threatened under the ESA. The same rule, however, noted that “critical habitat is not determinable for the Santa Ana sucker at this time.”<sup>27</sup>

Following the publishing of the final rule without designated critical habitat, the plaintiffs initiated further legal action by seeking to force the Service to make a final critical habitat determination. The court on February 26, 2003, ordered the Service to designate final critical habitat for the SAS no later than February 21, 2004, and issued a prohibition on the Service issuing biological opinions and concurrence letters for actions that may affect the SAS.<sup>28</sup> The Service published a final rule designating critical habitat for the SAS on February 26, 2004,<sup>29</sup> concurrent with a proposed rule.<sup>30</sup> The areas designated as critical habitat in this final rule are the focus of this analysis, the purpose of which is to assist the Secretary in determining whether the benefits of excluding particular areas from the designation (avoided costs) outweigh the biological benefits of including those areas in a revised final designation. The Service has since designated four units in three river basins as critical habitat for the SAS.

## 1.7 DESCRIPTION OF THE SPECIES AND HABITAT<sup>31</sup>

The Santa Ana sucker (*Catostomus santaanae*) is a recognized species and member of the sucker family. The SAS inhabits streams that are generally small and shallow, with currents ranging from swift (in

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<sup>27</sup> U.S. Fish and Wildlife Service, January 26, 1999, “Proposed Threatened Status for the Santa Ana Sucker, Proposed Rule,” *Federal Register*, Vol. 64, No. 16, p. 3920.

<sup>28</sup> U.S. District Court for the Northern District of California, February 26, 2003, “California Trout, California-Nevada Chapter of the American Fisheries Society, Center for Biological Diversity, and Friends of the River v. Gail Norton, Secretary of the Interior; and Steve Williams, Director, United States Fish and Wildlife Service,” No. C 97-3779 SI.

<sup>29</sup> U.S. Fish and Wildlife Service, February 26, 2004, “Final Rule to Designate Critical Habitat for the Santa Ana Sucker (*Catostomus santaanae*),” *Federal Register*, Vol. 69, No. 38, pp. 8839-8861.

<sup>30</sup> U.S. Fish and Wildlife Service, February 26, 2004, “Proposed Rule to Designate Critical Habitat for the Santa Ana Sucker (*Catostomus santaanae*),” *Federal Register*, Vol. 69, No. 38, pp. 8911-8915.

<sup>31</sup> Information on the Santa Ana sucker and its habitat is derived from the U.S. Fish and Wildlife Service, April 12, 2000, “Threatened Status for the Santa Ana Sucker, Final Rule,” *Federal Register*, Vol. 65, No. 71, pp. 19686-19688. It is provided in summary form only; specific citations have been omitted here.

canyons) to sluggish (in the bottomlands). All the streams inhabited by the species are subject to periodic severe flooding. The SAS appear to be most abundant where the water is cool (less than 22° Celsius) (72° Fahrenheit), unpolluted and clear, although they can tolerate and survive in seasonally turbid water. The SAS feed mostly on algae, which they scrape off of rocks and other hard substrates, and larger fish generally feed more on insects than do smaller fish. The lifespan of the SAS is generally no more than three years. Spawning occurs from early April to early July, with peak spawning activity occurring in late May and June. Females range in size from 78 millimeters (mm) (3.1 in) to 158 mm (6.2 in), and produce from 4,000 to 16,000 eggs per spawning period. The combination of early sexual maturity, protracted spawning period, and high fecundity should allow the SAS to quickly repopulate streams following periodic flood events that can decimate populations.

The native range of the SAS includes the Los Angeles, San Gabriel, and Santa Ana River drainage systems in Los Angeles, Orange, Riverside, and San Bernardino counties. Although historic records are scarce, the SAS presumably ranged from near the Pacific Ocean to the uplands in the Los Angeles River in the San Gabriel River system, and to at least Pump House #1 (near the San Bernardino National Forest boundary) in the Santa Ana River. Within its native range, the species is now restricted to three noncontiguous populations—lower Big Tujunga Creek (Los Angeles River drainage), the East, West, and North Forks of the San Gabriel River (San Gabriel River drainage), and the lower and middle Santa Ana River (Santa Ana River drainage).

Although the SAS was described as common in the 1970s, the species has experienced declines throughout most of its range. The present distribution of historic populations is as follows:

*Los Angeles River System.* Although historically present, the species may have been extirpated from the Los Angeles River. SAS are still found in portions of Big Tujunga Creek (a tributary of the Los Angeles River) below Big Tujunga Dam. Recent surveys downstream of Big Tujunga Dam found the species to be present but rare (fewer than 20 individuals collected at each site) in the vicinities of Delta Flat, Wildwood, and Big Tujunga Dam and abundant (an estimated 200 individuals collected) near Stoneyvale. The portions of Big Tujunga Creek occupied by the SAS constitute approximately 25 percent of the total remaining native range of the species. Approximately 60 percent of the range of the SAS in the Los Angeles River basin occurs on private lands. The remaining 40 percent of the range in the Los Angeles River basin occurs on Angeles National Forest lands managed by the USFS.

*San Gabriel River System.* In light of current threats and the prevailing absence of management, the only apparent viable population of SAS existing within the species' native range occurs in the San Gabriel River drainage system. In the San Gabriel River, the SAS appears extant only upstream of the confluence of the East, West, and North Forks of the San Gabriel River. The SAS population in the North Fork is small. The portions of the San Gabriel River occupied by the SAS constitute approximately 15 percent of the total remaining native range of the species. However, catch per unit effort information gathered during sampling suggests the San Gabriel River may contain the most individuals of any remaining population. Approximately 15 percent of the range of the SAS in the San Gabriel River basin occurs on private lands. The remaining 85 percent of the range in the San Gabriel River basin occurs in the Angeles National Forest.

*Santa Ana River System.* Several hundred SAS were observed in the Santa Ana River downstream of Prado Dam in 1986 and 1987. In 1996, a general fish survey of the Santa Ana River below Prado Dam yielded only five SAS from a total of 271 fishes captured. In April 1987, only five SAS were found during a sampling effort above the Prado Dam from the City of Norco to about three miles upstream. Thus, above the dam, fish were scarce, small individuals were absent, and evidence of reproduction was not obtained. In 1991, sampling indicated that although fishery habitat in the Santa Ana River was primarily fair to poor, SAS were abundant between the cities of Norco and Riverside. Additionally, evidence suggested SAS were using tributaries including Tequesquite Arroyo, Sunnyslope Channel, and Anza Park Drain for spawning and nurseries. The SAS survives in the lower portions of the Santa Ana River, from the Imperial Highway (State Route 90) to the confluence of the Rialto Drain and the Santa Ana River in San Bernardino County, but is now apparently absent from the upper reach of this river in the San Bernardino Mountains. The portions of the Santa Ana River occupied by the SAS constitute approximately 60 percent of the total remaining native range of the species. Approximately 95 percent of the range of the SAS in the Santa Ana River basin occurs on private lands. The balance is within State, county, city, and regional park lands, with a very small portion, three percent, on military lands. Chadwick and Associates (1996), and Haglund, et al., (2004) noted that length-frequency analysis indicates SAS are naturally reproducing in the Santa Ana River system. Furthermore, they asserted SAS population decreases in the river as evidenced by 1996 surveys were due to high flows in the basin between 1991 and 1996. However, it was also reported that the large number of SAS found in tributaries are juveniles and may be the progeny of very few adults.

In summary, the SAS has declined throughout significant portions of its current range and has lost approximately 75 percent of its historic range. Recent population densities range from approximately 246 fish in 1.8 miles on the East Fork, San Gabriel River to five fish in 4.5 miles of the Santa Ana River. This apparent overall decline in population is particularly surprising given the high fecundity and apparent broad habitat tolerances of the species. Urbanization, water diversions, dams, introduced competitors and/or predators, and other human-caused disturbances likely are playing a role in the decline of the species.

## **1.8 CRITICAL HABITAT DESIGNATION**

Portions of three river basins representing the native range of the SAS have been included as designated critical habitat. These areas were designated because they contain one or more of the “primary constituent elements” essential to the conservation of the species. In summary, these primary constituent elements include:<sup>32</sup>

- A functioning hydrological system that experiences peaks and ebbs in the water volume throughout the year;

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<sup>32</sup> Personal communication with Service Biologist, Carlsbad Fish and Wildlife Office, May 17, 2004.

- A mosaic of sand, gravel, cobble, and boulder substrates in a series of riffles, runs, pools, and shallow, sandy stream margins;
- Water depths greater than three centimeters and water bottom velocities greater than 0.03 meters per second;
- Non-turbid conditions or only seasonally turbid conditions;
- Water temperatures less than 30°C; and
- Stream habitat that includes algae, aquatic emergent vegetation, macroinvertebrates, and riparian vegetation.

Some areas within the Santa Ana River basin contain primary constituent elements, but were excluded from CHD. These areas, identified as “essential habitat,” were not designated pursuant to section 4(b)(2) of the ESA because the benefits of excluding them from critical habitat were greater than the benefits of including them in such designation. The following subsections contain descriptions of the geographic areas that are part of the CHD.

#### 1.8.1 SANTA ANA RIVER UNIT

Two areas comprise the Santa Ana River unit: Unit 1A, Northern Prado Basin, and Unit 1B, Santa Ana Wash. The Northern Prado Basin is located in San Bernardino County near the Riverside County boundary and south of the City of Chino. The critical habitat includes portions of both Mill Creek and Chino Creek, both of which drain to the Prado Flood Control Basin located to the south (and outside critical habitat), and eventually the nearby Santa Ana River. The area encompasses Prado Regional Park and Prado Lake, and contains portions of the El Prado Golf Course. It also contains or is adjacent to land occupied by dairies and irrigated cropland to the north and east, and near the California Institution for Men.

The Northern Prado Basin Unit contains potentially suitable habitat for the SAS, although dairy wastewater and wastewater treatment plants may heavily impact portions of the basin. Unit 1A, Northern Prado Basin, is not known to be occupied, but there have been very few surveys to date.<sup>33</sup>

The Santa Ana Wash Unit stretches from the upper watershed of Mill Creek, in the San Bernardino National Forest, west to the broad Santa Ana River floodplain area north of the City of Redlands, the lower portion of City Creek wash area, and further west to the narrower river channel as it flows south of the cities of San Bernardino and Colton. The terrain is forested with steep canyons in the mountain portion, surrounded by orange groves and new residential homes in the central wash, to more established

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<sup>33</sup> Ibid.

commercial and residential areas in the west. The Santa Ana River does not flow year round in this unit, but it provides a source of upstream gravel. Though it historically supported SAS, it is not known to be currently occupied. Survey efforts by the USACE associated with the construction of the Seven Oaks Dam support the notion that the SAS is not resident.<sup>34</sup>

### 1.8.2 SAN GABRIEL RIVER UNIT

Unit 2, San Gabriel River, is located entirely within the Angeles National Forest in Los Angeles County. The unit contains large portions of the West Fork, North Fork, and East Fork of the San Gabriel River, plus most of Cattle Canyon Creek, a tributary to the East Fork, as well as Bear Creek, and Big Mermaids Canyon Creek. The north end of San Gabriel Reservoir, at the confluence of the West and East Forks, is included. The entire stretch of river is contiguous with year round flows, although privately constructed “recreational dams” fragment the river. The area is heavily used for recreational activities, including suction dredge mining, OHV use, and swimming, wading, and bathing in constructed recreational pools. A popular OHV park lies within the West Fork of the San Gabriel River within a few miles of San Gabriel Reservoir. Despite the heavy in-stream use, this unit provides the best known habitat for the SAS within its existing range; surveys and reports indicate that the SAS population in this unit has a more diverse age structure than other units.<sup>35</sup>

### 1.8.3 BIG TUJUNGA CREEK

Unit 3, Big Tujunga Creek, is a relatively confined stretch of river between Big Tujunga Dam and Hansen Dam, including Hansen Lake, and most of Little Tujunga Creek. Approximately the eastern third is located in Angeles National Forest, and the western portion within the corporate boundary of the City of Los Angeles. The terrain in the east from Big Tujunga Dam downstream contains steep, forested canyons and sparsely scattered recreational buildings. To the west, the canyon opens to a broad valley less than a mile in width and residential development on the hillsides. Hanson Dam Park and the flood control basin is the western edge of Unit 3, Big Tujunga Creek. The unit contains the only known native minnow community, containing speckled dace, arroyo chub, and SAS. The current operation of the Big Tujunga Dam limits continuous flow during summer months, resulting in isolated pools. The USFS is developing a plan with the Los Angeles Department of Public Works, which owns the dam, to provide continuous water flow in Big Tujunga Creek.<sup>36</sup>

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<sup>34</sup> Ibid.

<sup>35</sup> Ibid.

<sup>36</sup> Ibid.

#### **1.8.4 ESSENTIAL HABITAT, CRITICAL HABITAT, AND EXCLUDED LANDS**

As noted earlier, some areas of the Santa Ana River basin contained primary constituent elements for the SAS, and collectively these areas are termed “essential habitat.” Much of the essential habitat was then designated as critical habitat, but some was excluded from the CHD. The so-called “excluded lands” (EL) were not designated as critical habitat. The EL is located in Riverside and Orange counties, with a small portion in San Bernardino County. Critical habitat is designated only in San Bernardino and Los Angeles counties.

For the purposes of this report, economic effects are quantified for critical habitat and protective measures for the SAS, but consideration is given for effects that may occur in EL. As such, distinctions are made in the report between effects that occur in critical habitat and those that occur in excluded lands.

#### **1.8.5 A NOTE ABOUT CRITICAL HABITAT AND EFFECTS**

The Service has designated critical habitat in particular stream corridors or washes and some adjacent lands in all three areas. While most of the activities that may affect the SAS will likewise take place within these waterways, it is nevertheless possible that activities adjacent to or even some distance from the waterway could have an impact on the SAS or its habitat. For example, activities such as road construction could result in erosion and eventual depositing of sediment downstream in SAS critical or essential habitat. This analysis accounts for and includes these activities in the economic analysis, while also providing sufficient detail on the area of impacts. These geographic areas of impact are reported at the small stream basin level.

### **1.9 ORGANIZATION OF THE REPORT**

The remainder of this report is divided into six sections. The next section describes the framework for analyzing the economic impacts associated with SAS conservation measures in the three basins. This includes a description of the general analytic approach to estimating economic effects, operating definitions of retrospective and prospective effects, general categories of economic effects, and assumptions such as time frame of analysis and discount rate.

A socioeconomic profile of the critical habitat and essential habitat area is included in the next section. The profile is presented in terms of the affected counties as the smallest unit of measure for much of the data presented. This is followed by a discussion of the regulatory environment, which includes the Federal, State, and local laws and regulations that are relevant to the analysis. In some cases, the State of California is responsible for regulation of actions affecting the environment; as such, there may not be a Federal nexus that might otherwise be in place.

The different categories of economic effects are examined in the next two sections. The first addresses the effects on residential and commercial development; the application of an “open city” model of development is presented. The second of the two sections on economic effects addresses the other

categories that may apply in each or all of the three basins. Finally, the last section of the report presents a summary of the findings and discussion of the results for the SAS.

A number of appendices are included with this report. Appendix A addresses the economic effects of SAS conservation measures on small entities and the nation's energy supply. Appendix B includes a presentation of the analytic framework for determining effects on residential and commercial development. Appendix C introduces an analysis of the concept of amenity values (or negative costs) that may apply to newly developed land within or proximate to critical habitat. Appendix D includes a list of the acronyms used in the report. A Map Attachment is also provided and contains all maps referenced in the text of the report.

### 1.9.1 CATEGORIES OF COSTS DELINEATED

Subsections that address specific categories of economic efficiency effects are organized by the types of costs that are incurred. These types include:

- **Section 7 Consultation Costs:** These are costs incurred by Federal agencies and the Service in consultation, and preparation of biological assessments and biological opinions. Consultation costs for agencies include both retrospective and prospective costs.
- **Non-Section 7 Project Modification Costs:** These are costs incurred by Federal agencies or private entities associated with project modifications that are necessary to avoid incidental take of listed species. Both retrospective and prospective costs are addressed.
- **Retrospective Costs:** These are costs incurred by private entities (in addition to project modification costs) between the time of the SAS listing and the CHD, and include the economic effects on private entities caused by restrictions to behavior or actions.
- **Prospective or Forecasted Costs:** These costs include future or anticipated economic effects on private entities (in addition to project modification costs) that would result from the listing or conservation measures associated with SAS.

These types of economic effects are discussed in detail in Section 2.2. In addition to these efficiency effects, distributional and secondary effects may also be associated with the costs identified above, particularly where there are costs borne by private sector. These are also discussed in Section 2.2.

This section describes the framework for analyzing the economic impact of conservation actions taken to protect SAS and its habitat.<sup>37</sup> This section first describes the general analytic approach to estimating economic costs of a CHD, as well as protective measures taken as a result of the species' listing or Federal, State, and local laws that aid habitat conservation in the areas designated, including a discussion of efficiency and distributional effects, as well as retrospective and prospective effects. Methods used to evaluate each of the different general categories of economic effects, such as Federal and private efficiency effects, as well as distributional effects, are also described. The time frame and discount rate used in the analysis are described, as well as general caveats and assumptions that apply to all categories examined.

## **2.1 RETROSPECTIVE AND PROSPECTIVE EFFECTS**

The economic analysis includes both retrospective and prospective effects. Retrospective effects include those that have accrued since the time that the SAS was listed as threatened but prior to designation of critical habitat. This retrospective analysis begins with the January 26, 1999, proposed rule listing the SAS as threatened.<sup>38</sup> Prospective impacts include likely future cost associated with SAS conservation measures between 2004 and 2024. This prospective analysis attempts to forecast the costs of conservation measures likely to be within the CHD assuming that the designation currently in place remains unchanged.

## **2.2 GENERAL CATEGORIES OF ECONOMIC EFFECTS**

### **2.2.1 FEDERAL**

Federal agencies incur costs that are directly attributable to compliance with the ESA. As noted above, the Service is charged with enforcement, administration, consultation, and monitoring; these costs are predominantly programmatic, and some may be discernable to the SAS listing. However, action agencies—those responsible for authorizing or carrying out projects or activities that could have an impact on an endangered species or its habitat—also incur costs through consultations, environmental studies, or necessary project modifications that can be directly or indirectly attributable to conservation measures associated with SAS.

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<sup>37</sup> Much of the general framework discussion represents guidance from the Service and incorporates language employed in prior analyses of critical habitat designation.

<sup>38</sup> U.S. Fish and Wildlife Service, January 26, 1999, "Threatened Status for the Santa Ana Sucker, Proposed Rule," *Federal Register*, Vol. 64, No. 16, pp. 3915-3923.

### 2.2.1.1 Section 7 Consultations, Technical Assistance, and Project Modifications

All Federal agencies are required by the ESA to ensure the activities they authorize, fund, or carry out do not jeopardize a listed species or adversely modify or destroy designated critical habitat. Consultations may be formal or informal, but in either case the action agency incurs costs to interact with the Service. Costs include preparing Biological Assessments, meeting with Service staff to discuss project details, and implementing conservation measures to avoid, minimize, or offset impacts to listed species. Federal agencies may also incur costs for monitoring a species' population status and habitat conditions.

Administrative costs of consultations, along with the costs of project modifications resulting from these consultations, represent compliance costs associated with the listing of the species and CHD. In this report, the number and types of consultations with the Service are identified and presented. The costs associated with compliance and project modifications are addressed, and administrative costs are included.

### 2.2.2 PRIVATE

The CHD for the SAS or any other endangered species has the potential to impose costs on private individuals or groups of individuals if there is a connection or nexus between private activities and Federal actions. For example, if a Federal permit is required before developers can begin construction or if there is Federal funding for a private activity, then it is possible that the provisions of the ESA, including CHD, may potentially restrict private actions. This section identifies and briefly discusses some of the categories of economic activity that may be affected by the CHD through a Federal nexus. These categories include commercial and residential development, utilities, transportation, recreation, mining, and others.

#### 2.2.2.1 Framework for Residential and Commercial Development Effects

When critical habitat areas are designated in a region, developers may face the following three types of restrictions and costs: 1) development may be prohibited in riparian areas and near lakes, which will impose costs to developers and landowners; 2) development may be allowed in the designated areas, but developers in these areas are required to take additional on-site measures to reduce sedimentation, protect forest cover, and manage storm water; and/or 3) development may be allowed in the designated areas, but appropriate mitigation activities must be taken. The mitigation activities can be onsite or offsite. Thus, the impact of a CHD on residential and commercial development may include the following components:

- Cost of development restrictions (e.g., prohibit development in riparian areas or near lakes and thus reduce the supply of developable land);
- Cost of project modifications and improvements (e.g., additional requirements for sedimentation reduction or stormwater management may be required); and

- Cost of mitigation activities for development (e.g., habitat restoration, land set-aside, and off-site conservation).

In this analysis, the costs to residential and commercial development arising from SAS conservation measures are estimated based on the assumption that development is allowed in the designated areas if appropriate mitigation activities are taken. Thus, in this analysis, we assume that no land is removed from potential development as a result of development restrictions. The mitigation activities for development include habitat restoration, land set-aside, and off-site conservation. The costs for these mitigation activities and the agencies' management and monitoring costs for habitat restoration are paid by developers or landowners. Thus, of the three cost components, only the last one is relevant for this analysis. The methods for calculating this component are discussed below. The methods for calculating the first two components of cost are discussed in the Appendix B.

### Cost of Mitigation Activities for Development

The net present value approach is used to measure the cost of mitigation activities for development. This approach allows us to estimate the cost by different types of development (e.g., low-density residential, medium-density residential, high-density residential, commercial, industrial) and by region (e.g., a particular river basin or unit). The framework requires several pieces of information, including: a) projected acres of each type of development in each area designated for critical habitat, b) percent of development actually "burdened" by the requirements, and c) per-acre costs of project modification for the "burdened" development. With these data, the prospective cost of CHD for commercial and residential development during a given time period (e.g., from 2004 to 2024) can be estimated by the following formula, where total cost (TC) is measured in 2003 dollars:

$$(1) \quad TC = \sum_{t=2004}^{2023} \sum_{i=1}^I \frac{A_t^i S_t^i C_t^i}{(1+r)^{t-2004}}$$

$i =$  types of development (e.g., low-density residential, high-density residential, commercial, mixed development, etc.)

$A_t^i =$  projected acres of type  $i$  development in year  $t$

$S_t^i =$  percent of type- $i$  development actually burdened

$C_t^i =$  per-acre or per unit project modification cost

$r =$  discount rate

Likewise, the retrospective cost of habitat designation for commercial and residential development during a given time period (e.g., from 1999 to 2004) can be estimated by the following formula, where the retrospective cost is also measured in 2003 dollars:

$$(2) \quad TC = \sum_{t=1999}^{2004} \sum_{i=1}^I [A_t^i S_t^i C_t^i (1+r)^{2004-t}]$$

#### 2.2.2.2 Framework for Effects on Recreational Activities on Forest Lands

The upper basins for all three areas are located in National Forests within the Los Angeles metropolitan area. Thousands of people visit these locations annually and there are considerable effects on the habitat of these areas, including destruction of streambank vegetation, streambank erosion, and the disposal of untreated human waste and other refuse into the creeks, all of which degrade water quality. In addition, swimmers often install temporary dams to create swimming areas but which limit fish mobility and downstream flow. An OHV park adjacent to the West Fork of the San Gabriel River may cause water quality problems. In addition to water quality problems, OHV use can damage the physical structure of the stream resulting in degraded habitat conditions (i.e., increase in embeddedness, loss of streamside vegetation, loss of undercut banks and pools). There is also some evidence that heavy OHV use can reduce the biological diversity of the invertebrate community which contributes to the SAS diet.<sup>39</sup>

We investigate the effects on recreational activities by a review of the Forest Management Plans for the Angeles and San Bernardino National Forests, and discuss with USFS personnel potential changes that may be required as a result of the CHD. These will be quantified in terms of changes in recreational visitation and associated changes in the value attributable to visitors. Our estimates will account for the relative availability of alternative recreation sites.

#### 2.2.3 SECONDARY AND REGIONAL EFFECTS

Regional economic impact analysis can provide an assessment of the potential localized effects of conservation activities. Specifically, regional economic impact analysis produces a quantitative estimate of the potential magnitude of the initial change in the regional economy resulting from a regulatory action. Regional economic impacts are commonly measured using regional input/output models, such as those created using IMPLAN modeling software and databases. These models rely on multipliers that mathematically represent the relationship between a change in one sector of the economy (e.g., expenditures by recreationists) and the effect of that change on economic output, income, or employment in other local industries (e.g., suppliers of goods and services to recreationists). These economic data provide a quantitative estimate of the magnitude of shifts of jobs and revenues in the local economy. These additional impacts are referred to as “secondary effects.”

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<sup>39</sup> Personal communication with Service Biologist, Carlsbad Fish and Wildlife Office, July 27, 2004.

The use of regional input/output models in an analysis of the impacts of species and habitat conservation efforts can overstate the long-term impacts of a regulatory change. Most importantly, these models provide a static view of the economy of a region. That is, they measure the initial impact of a regulatory change on an economy but do not consider long-term adjustments that the economy will make in response to this change. For example, these models provide estimates of the number of jobs lost as a result of a regulatory change, but do not consider re-employment of these individuals over time or other adaptive responses by impacted businesses. In addition, the flow of goods and services across the regional boundaries defined in the model may change as a result of the regulation, compensating for a potential decrease in economic activity within the region.

Despite these and other limitations, in certain circumstances regional economic impact analysis may provide useful information about the scale and scope of localized impacts. It is important to remember that measures of regional economic effects generally reflect shifts in resource use rather than efficiency losses. Thus, these types of distributional effects are reported separately from efficiency effects (i.e., not summed). In addition, measures of regional economic impact cannot be compared with estimates of efficiency effects, but should be considered as distinct measures of impact.

#### 2.2.4 EFFECTS ON SMALL ENTITIES

This analysis considers how small entities, including small businesses, organizations, and governments, might be affected by future SAS conservation activities. The analysis follows guidelines appropriate for the Regulatory Flexibility Act (RFA).<sup>40</sup> Those activities involving small entities are identified, affected small entities described, and potential effects estimated, depending on the availability of data. This analysis is included in Appendix A of this report.

#### 2.2.5 EFFECTS ON ENERGY SUPPLY

In adherence with Executive Order 13211, “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use,” the analysis considers the future impacts of conservation activities on the energy industry and its customers.<sup>41</sup> This involves analyzing impacts associated with changes in existing or proposed energy generating facilities as a result of the CHD. If the designation results in a reduction of more than 500 megawatts of installed capacity, the potential electricity price impacts are also considered. This analysis is included in Appendix A of this report.

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<sup>40</sup> 5 U.S.C. § 601 *et seq.*

<sup>41</sup> Executive Order 13211, May 18, 2001, “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use.”

## **2.3 PROJECT LIFE, PERIOD OF ANALYSIS, AND DISCOUNT RATE**

The period of analysis and discounting is guided by the availability of information concerning the start date and duration of the activity. Each potential cost component has a time period that is appropriate for that specific activity or investment. The time period used is therefore discussed in each section describing the effects of individual types of activities. For example, in evaluating the effects of conservation activities on residential and commercial property, a time frame of 20 years was used to reflect the useful life of modifications to construction of protective measures.

The time frame associated with each activity is important because as the time horizon for an economic analysis is expanded, the forecast of future projects becomes increasingly speculative. As a result, a consistent time frame of 20 years is applied to all activities. This provides a time frame within which economic assumptions and forecasts are likely to remain viable. Also, from a practical standpoint, any values beyond 20 years will be rendered insignificant by the process of discounting, and thus would have little effect on the present value of the activity or action in question.

Some costs are recurring while others are one time costs. These costs are presented both as net present values and as annualized costs. The total cost per unit of designated habitat represents the summation of annualized costs obtained for each of the component economic impacts. Prospective (future) costs are presented using both a seven percent and three percent discount rate.

## **2.4 CAVEATS AND ASSUMPTIONS**

The assumptions presented here include only those which in general apply to all areas included in the analysis. Similar information on assumptions and possible bias that apply specifically to individual habitat units or stream reaches appear later in the report, within the particular section related to the relevant CHD area.

These general caveats, and those presented later relevant to each unit, describe factors that introduce uncertainty into the results of this analysis. The Service therefore solicits from the public further information on any of the issues presented in the discussions and tables of caveats. Additionally, information pertaining to the following questions is requested.

- Are data available to develop more accurate estimates of the number of future consultations, project modifications, and costs for the activities related to private lands?
- Are data available on additional land use practices, or current or planned activities in designated critical habitat areas, that are not specifically or adequately addressed in this analysis?
- Are data available on additional co-extensive impacts (such as additional regulatory burdens from State or local laws triggered by the designation of critical habitat) that are not specifically or adequately addressed in this analysis?

## 3.0

### SOCIOECONOMIC PROFILE OF THE CRITICAL HABITAT AREA

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Key economic and demographic information, including population characteristics and general economic activity, for the counties containing CHD and excluded lands (EL) for the SAS is presented in this subsection. The smallest area for which socioeconomic data are available most reliably is at the county level, so county data are presented in order to provide context for the discussion of potential economic impacts later in this report. The county data also might serve to illuminate trends within the CHD and EL areas that could influence the potential economic impacts, and therefore aid in the analysis of those impacts. Although county level data may not precisely reflect the socioeconomic characteristics of the areas immediately surrounding the CHD and EL for the SAS, these data provide the best context for the broader analysis.

#### 3.1 GEOGRAPHIC DESCRIPTION OF THE REGION

The SAS occupies stream reaches within four counties in southern California: Los Angeles, Orange, Riverside, and San Bernardino. The occupied portions of the rivers and streams are all located inland from, but within 50 miles of, the Pacific Ocean. The combined region occupies the bottomlands and foothills of the broad Los Angeles basin, west and southwest from the San Gabriel and San Bernardino Mountains. Elevations range from about 840 feet in the bottomlands at Riverside to mountain peaks exceeding 10,000 feet above sea level. The climate of the region is characterized by a strong desert influence, moderated at times by marine air from the Pacific Ocean. Summer temperatures are warm to hot, with an average daily maximum in July in San Bernardino of 100°F. Annual precipitation averages 15 inches in the lowlands to more than 30 inches in the mountains, with rainfall primarily in the winter and almost non-existent in the months of May through September. The region as a whole is flat and highly urbanized in the lowlands, and forested mountains in the uplands, where it is part of the Angeles and San Bernardino National Forests.

#### 3.2 POPULATION CHARACTERISTICS AND DEMOGRAPHICS

Although the SAS is found in four counties within the State of California, the CHD for the SAS includes portions of just Los Angeles and San Bernardino counties. Orange and Riverside counties contain only essential habitat, which has been excluded from the CHD for the SAS (see discussion in Section 1.8.4). Because SAS conservation measures apply to lands within both CHD and EL areas, socioeconomic data for all four counties are presented here. Table 1 presents the population size, change in population from 1990 to 2000, per capita income, and poverty rates for the four individual counties with CHD and EL for the SAS within their boundaries, and the State of California as a whole. The four counties combined account for over 46 percent of the total population of the State, or nearly 16.5 million people. As the most populated county in the nation, Los Angeles County represents nearly 28 percent of the State's total population. Orange County is the second most populated in the State, with nearly three million residents.

With over 1.8 million residents, San Bernardino County ranks fourth among California counties in terms of population size, followed by Riverside County in fifth, with a population just under 1.8 million.

**Table 1**  
**Socioeconomic Profile of Counties Containing**  
**Critical Habitat and Excluded Lands for the Santa Ana Sucker**

<b>County/State</b>	<b>Population (2003)</b>	<b>Percent of State (2003)</b>	<b>Change (1990-2000)</b>	<b>Per Capita Income (2001)</b>	<b>Poverty Rate (2000)</b>
Los Angeles County	9,871,506	27.8%	+7.4%	\$30,611	15.9%
Orange County	2,957,766	8.3%	+18.1%	\$36,647	9.3%
Riverside County	1,782,650	5.0%	+32.0%	\$25,691	12.5%
San Bernardino County	1,859,678	5.2%	+20.5%	\$22,141	15.0%
<b>California State</b>	<b>35,484,453</b>	<b>100.0%</b>	<b>+13.8%</b>	<b>\$32,655</b>	<b>12.7%</b>

Sources:

2003 population estimates: U.S. Census Bureau, "Annual Population Estimates 2000-2003," downloaded from <http://eire.census.gov/popest/data/counties/CO-EST2003-01.php>, June 3, 2004.

2000 poverty estimates: U.S. Census Bureau, "Small Area Income and Poverty Estimates," downloaded from <http://www.census.gov/hhes/www/saie/estat/estatetoc.html>, May 12, 2004.

1990-2000 population change: U.S. Census Bureau, "Ranking Tables for Counties," downloaded from <http://www.census.gov/population/www/cen2000/phc-t4.html>, May 12, 2004.

2001 per capita income: U.S. Department of Commerce, May 2003, Bureau of Economic Analysis, *Regional Economic Information System 1969-2001*, CD-ROM.

During the 1990s, the population of Los Angeles County increased by just 7.4 percent, considerably less than the statewide average of 13.8 percent. Populations in the other three counties, however, increased significantly over the same time period, with growth rates ranging from 18.1 percent in Orange County to 32.0 percent in Riverside County. Per capita incomes in Los Angeles, Riverside, and San Bernardino are lower than the statewide average of \$32,655, while Orange County has a per capita income of \$36,647, which is greater than the State average. It should be noted, however, that the California State income average is driven up strongly by a number of counties in the San Francisco Bay Area with very high per capita incomes, such as Santa Clara County, where the per capita income exceeds \$51,000.

The poverty rate for a region is the percentage of people who are estimated to live below the poverty level, which is based on national levels set for minimum income requirements for various sizes of households. Poverty rates for the four counties range from a low of 9.3 percent in Orange County to a high of 15.9 percent in Los Angeles County. Poverty rates in Los Angeles and San Bernardino counties both exceed the State average of 12.7 percent.

### **3.3 EMPLOYMENT AND ECONOMIC ACTIVITY**

Employment is a key economic indicator, as patterns of growth and decline in a region's employment are largely driven by economic cycles and local economic activity. Current employment figures can be

examined to provide a “snapshot” of a region’s economy, highlighting key industries. Recent employment data for the four counties containing CHD and EL for the SAS are presented in Table 2. Employment is given for each industry group in terms of the number of jobs, which includes both full-time and part-time jobs, and as a percentage of the total jobs for each county.

Total employment in Los Angeles County is 5,580,781, accounting for about 28 percent of total employment in the State of California. The county has a very diverse economic base, with employment spread among a number industries. The largest employer is the trade, transportation, and utilities industry group, with over one million jobs, or 18 percent of total employment in the county. About 400,000 of these jobs are related to retail trade, and another 218,000 jobs are related to wholesale trade.<sup>42</sup> Other major employers in Los Angeles County are professional and business services, with about 17 percent of total jobs, and government and manufacturing, each with about 11 percent of total jobs. Natural resource related industries, such as farming and mining, provide only a small portion of the total employment in the county, with less than one percent of all jobs found in agricultural production, mining, and forestry, hunting, fishing, and related activities.

Orange County employment totals 1,899,085 jobs, or slightly less than ten percent of California’s total employment. Professional and business services, with 19 percent of the county’s total jobs, is the leading employer, followed by trade, transportation, and utilities, with 17 percent. Other significant employers in Orange County are manufacturing and financial activities, each with nearly 12 percent of total jobs. Similar to Los Angeles County, natural resource related industries provide only a small portion of Orange County’s employment, with less than one percent of all jobs in agricultural production, mining, and forestry, hunting, fishing, and related activities.

Riverside County employment is 685,082 jobs, or about 3.5 percent of total employment in the State of California. About 18 percent of jobs in the county are found in trade, transportation, and utilities; retail trade represents over 70 percent of those jobs.<sup>43</sup> Government is also a significant employer, contributing 15 percent of total county jobs. Professional and business services, construction, and leisure and hospitality each provide more than ten percent of jobs in Riverside County. Nearly two percent of Riverside County employment is related to agricultural production on farms, and another 1.4 percent is found in the forestry, hunting, fishing, and related activities sector.

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<sup>42</sup> California Employment Development Department, 2003, “County Snapshots: Los Angeles,” Labor Market Information Division.

<sup>43</sup> California Employment Development Department, June 24, 2004, “Riverside County – Industry Employment and Labor Force by Annual Average,” downloaded from <http://www.calmis.cahwnet.gov/htmlfile/county/river.htm>.

**Table 2**  
**2001 Employment in Counties Containing**  
**Critical Habitat and Excluded Lands for the Santa Ana Sucker**  
**(Number of Jobs and Percentage of Total Jobs)**

		<b>Los Angeles</b>	<b>Orange</b>	<b>Riverside</b>	<b>San Bernardino</b>
	<b>Total Employment</b>	<b>5,580,781</b>	<b>1,899,085</b>	<b>685,082</b>	<b>740,605</b>
<b>Goods Producing:</b>	Agricultural Production (Farm)	7,662 (0.1%)	6,705 (0.4%)	12,587 (1.8%)	5,257 (0.7%)
	Forestry, Hunting, Fishing, and Related Activities <sup>a/</sup>	4,512 (0.1%)	2,017 (0.1%)	9,739 (1.4%)	1,519 (0.2%)
	Mining	7,741 (0.1%)	2,179 (0.1%)	989 (0.1%)	990 (0.1%)
	Construction	215,487 (3.9%)	107,742 (5.7%)	70,695 (10.3%)	49,057 (6.6%)
	Manufacturing	619,477 (11.1%)	224,732 (11.8%)	56,036 (8.2%)	72,272 (9.8%)
<b>Service Providing:</b>	Trade, Transportation, and Utilities <sup>b/</sup>	1,007,459 (18.1%)	332,533 (17.5%)	119,895 (17.5%)	162,164 (21.9%)
	Leisure and Hospitality <sup>c/</sup>	501,404 (9.0%)	186,678 (9.8%)	69,757 (10.2%)	57,947 (7.8%)
	Financial Activities <sup>d/</sup>	496,701 (8.9%)	219,309 (11.5%)	53,927 (7.9%)	51,496 (7.0%)
	Information	245,885 (4.4%)	48,547 (2.6%)	8,529 (1.2%)	10,310 (1.4%)
	Professional and Business Services <sup>e/</sup>	939,562 (16.8%)	361,826 (19.1%)	78,073 (11.4%)	89,479 (12.1%)
	Educational and Health Services <sup>f/</sup>	553,338 (9.9%)	149,924 (7.9%)	61,111 (8.9%)	75,726 (10.2%)
	Other Services	354,652 (6.4%)	97,478 (5.1%)	41,174 (6.0%)	41,578 (5.6%)
	Government	626,901 (11.2%)	159,415 (8.4%)	102,570 (15.0%)	122,810 (16.6%)

a/ also includes Agricultural Services

b/ includes Utilities, Transportation and Warehousing, Retail Trade, and Wholesale Trade

c/ includes Accommodation and Food Services, and Arts, Entertainment, and Recreation

d/ includes Finance and Insurance, and Real Estate and Rental and Leasing

e/ includes Professional, Scientific, and Technical Services, Administrative Support, Waste Management, and Remediation Services, and Management of Companies and Enterprises

f/ includes Education Services and Health Care and Social Assistance

Source: U.S. Department of Commerce, May 2003, Bureau of Economic Analysis, *Regional Economic Information System 1969-2001*, CD-ROM.

Employment in San Bernardino County is 740,605 jobs, or about 3.7 percent of total employment in the State of California. Nearly 22 percent of these jobs are in trade, transportation, and utilities, of which about half are related to retail trade.<sup>44</sup> The second largest county employer is government, with nearly 17 percent of total employment.

Earnings from employment in counties containing proposed CHD are presented in Table 3, broken out by industry group as employment was in the previous table. Earnings represent the sum of three components of personal income: wage and salary disbursements, other labor income (includes employer contribution to pension and profit-sharing, health and life insurance, and other non-cash compensation), and proprietors' income. Earnings reflect the amount of income that is derived directly from work and work-related factors. Earnings can be used as a proxy for the income that is generated within a geographical area by industry sectors, and can be used to identify the significant income-producing industries of a region or to show trends in industry growth or decline.

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<sup>44</sup> California Employment Development Department, June 24, 2004, "San Bernardino County – Industry Employment and Labor Force by Annual Average," downloaded from <http://www.calmis.cahwnet.gov/htmlfile/county/sbern.htm>.

**Table 3**  
**2001 Earnings from Employment in Counties Containing**  
**Critical Habitat and Excluded Lands for the Santa Ana Sucker**  
**(Millions of Dollars and Percentage of Total Earnings)**

		<b>Los Angeles</b>	<b>Orange</b>	<b>Riverside</b>	<b>San Bernardino</b>
	<b>Total Employment</b>	<b>\$234,747.4</b>	<b>\$80,005.5</b>	<b>\$20,506.8</b>	<b>\$23,706.9</b>
<b>Goods Producing:</b>	Agricultural Production (Farm)	\$205.7 (0.1%)	\$210.9 (0.3%)	\$232.2 (1.1%)	\$170.2 (0.7%)
	Forestry, Hunting, Fishing, and Related Activities <sup>a/</sup>	\$99.5 (0.0%)	\$35.4 (0.0%)	\$169.7 (0.8%)	\$34.6 (0.1%)
	Mining	\$430.2 (0.2%)	\$69.1 (0.1%)	\$33.6 (0.2%)	\$43.3 (0.2%)
	Construction	\$9,647.7 (4.1%)	\$6,058.4 (7.6%)	\$2,762.0 (13.5%)	\$1,927.6 (8.1%)
	Manufacturing	\$27,620.0 (11.8%)	\$11,290.4 (14.1%)	\$2,155.6 (10.5%)	\$2,685.5 (11.3%)
<b>Service Providing:</b>	Trade, Transportation, and Utilities <sup>b/</sup>	\$36,359.9 (15.5%)	\$14,765.9 (18.5%)	\$3,317.0 (16.2%)	\$4,921.2 (20.8%)
	Leisure and Hospitality <sup>c/</sup>	\$14,409.1 (6.1%)	\$4,240.6 (5.3%)	\$1,274.3 (6.2%)	\$879.8 (3.7%)
	Financial Activities <sup>d/</sup>	\$20,143.1 (8.6%)	\$9,154.3 (11.4%)	\$1,077.3 (5.3%)	\$1,319.1 (5.6%)
	Information	\$22,739.4 (9.7%)	\$3,133.5 (3.9%)	\$314.9 (1.5%)	\$415.0 (1.8%)
	Professional and Business Services <sup>e/</sup>	\$44,392.0 (18.9%)	\$15,635.1 (19.5%)	\$1,957.7 (9.5%)	\$2,303.2 (9.7%)
	Educational and Health Services <sup>f/</sup>	\$20,229.5 (8.6%)	\$5,711.7 (7.1%)	\$1,895.4 (9.2%)	\$2,552.5 (10.8%)
	Other Services	\$7,057.9 (3.0%)	\$2,178.7 (2.7%)	\$897.8 (4.4%)	\$840.4 (3.5%)
	Government	\$31,413.4 (13.4%)	\$7,521.5 (9.4%)	\$4,419.1 (21.5%)	\$5,614.5 (23.7%)

a/ also includes Agricultural Services

b/ includes Utilities, Transportation and Warehousing, Retail Trade, and Wholesale Trade

c/ includes Accommodation and Food Services, and Arts, Entertainment, and Recreation

d/ includes Finance and Insurance, and Real Estate and Rental and Leasing

e/ includes Professional, Scientific, and Technical Services, Administrative Support, Waste Management, and Remediation Services, and Management of Companies and Enterprises

f/ includes Education Services and Health Care and Social Assistance

Source: U.S. Department of Commerce, May 2003, Bureau of Economic Analysis, *Regional Economic Information System 1969-2001*, CD-ROM.

## **4.1 OTHER ESA LISTED SPECIES**

It is important to consider other Federally listed species in the region, as protections for these species and any of their designated critical habitats may benefit the SAS as well. When a consultation is triggered for any listed species, the Service will also take into account all other listed species known or thought to occupy areas on or near the project lands. Past Section 7 consultations for the SAS have included a number of listed species, as many as 59 in one case.<sup>45</sup>

The Service maintains lists of threatened and endangered species, and organizes the list by state ([http://ecos.fws.gov/tess\\_public](http://ecos.fws.gov/tess_public)). For California, there are 292 listed species, second only to Hawaii among states, including 113 listed animals (26 are fish species) and 179 plant species.<sup>46</sup> A subset of these listed species is found in the three basins for which the SAS is listed, including the endangered southwestern willow flycatcher, San Bernardino kangaroo rat, and arroyo toad, and threatened coastal California gnatcatcher, among others. Some conservation measures may have been in place for many of these species that may provide incidental protection for the SAS. The Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP), discussed in Section 4.3.2 addresses conservation needs for 146 species, including the SAS.

## **4.2 FEDERAL AND CALIFORNIA STATE STATUTES AND REGULATIONS**

### **4.2.1 CLEAN WATER ACT**

The purpose of the Clean Water Act (CWA) is to restore the physical, biological, and chemical integrity of the waters of the United States using two basic mechanisms: (1) direct regulation of discharges pursuant to permits issued under the NPDES and section 404 (discharge of dredge or fill materials); and (2) the Title III water quality program.<sup>47</sup>

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<sup>45</sup> The 2001 biological and conference opinions involving changes to the land and resource management plans for four southern California national forests (two of which contain the SAS) involved 59 Federally listed species, one species proposed for Federal listing, designated critical habitat for ten species, and proposed critical habitat for four species.

<sup>46</sup> U.S. Fish and Wildlife Service, “Threatened and Endangered Species System (TESS),” [http://ecos.fws.gov/tess\\_public/TESSWebpage](http://ecos.fws.gov/tess_public/TESSWebpage), accessed July 22, 2004.

<sup>47</sup> Clean Water Act, 33 U.S.C. §1251 (1987).

Under the NPDES program, EPA sets pollutant-specific limits on the point source discharges for major industries and provides permits to individual point sources that apply these limits. EPA has delegated responsibility for the NPDES permitting program to most states.<sup>48</sup> State-issued NPDES permits are treated as non-Federal actions. As such, the issuance of NPDES permits by states is not subject to the consultation requirements of the ESA. The Service consults with the EPA on the triennial review to ensure that threatened and endangered species impacts are contemplated in the development of standards.

Under the water quality standards program, EPA has issued water quality criteria to establish limits on the ambient concentration of pollutants in surface waters that will still protect the health of the water body. States issue water quality standards that reflect the Federal water quality criteria and submit the standards to EPA for review. State water quality standards are subject to review every three years (triennial review). States apply the standards to NPDES discharge permits to ensure that discharges do not violate the water quality standards.<sup>49</sup>

Under section 401 of the CWA, all applicants for a Federal license or permit to conduct activity that may result in discharge to navigable waters of the United States are required to submit a State certification to the licensing or permitting agency. Section 404 of the CWA prescribes a permit program for the discharge of dredged or fill material into navigable waters. Specifically, pursuant to section 404, permit applicants are required to show that they have “taken steps to avoid wetland impacts, where practicable, minimized potential impacts to wetlands, and provided compensation for any remaining, unavoidable impacts through activities to restore or recreate wetlands.”<sup>50</sup>

The CWA will influence activities on nearly all of the SAS critical habitat units, because these activities (e.g., road/bridge construction and hydroelectric power relicensing) will require NPDES or section 404 permits and occur on or near all units. Because water quality is important to the conservation of the SAS, this statute will likely impact the extent, location, and nature of future activities on or near the designated critical habitat units. As such, the CWA is likely to provide some protection to the SAS.

#### 4.2.2 THE WILDERNESS ACT

Congress created the National Wilderness Preservation System from lands already administered by the Federal government through the Wilderness Act of 1964. The purpose of the Wilderness Act was to “secure for the American people of present and future generations the benefits of an enduring resource of wilderness.” The upper portion Cattle Canyon Creek, a tributary to the East Fork of the San Gabriel River (Unit 2), is located within the Sheep Mountain Wilderness Area. Congress specified the uses of

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<sup>48</sup> Clean Water Act, 33 U.S.C. §402.

<sup>49</sup> Clean Water Act, 33 U.S.C. §303, 305.

<sup>50</sup> U.S. Environmental Protection Agency, September 26, 2003 (last updated), “Section 404 of the Clean Water Act: An Overview,” <http://www.epa.gov/owow/wetlands/facts/fact10.html>.

wilderness to be recreational, scientific, educational, historical, and for conservation. In general, extractive activities such as suction dredge mining are generally prohibited by the act, although certain activities that occurred prior to the designation of wilderness, such as grazing or mining, may be allowed to continue. However, such activities are not present in the Sheep Mountain Wilderness.

#### 4.2.3 CALIFORNIA ENVIRONMENTAL QUALITY ACT

The California Environmental Quality Act (CEQA) (P.R.C. 21000 et seq.) establishes State policy to prevent actions or project modifications from causing significant, avoidable damage to the environment by requiring changes through the use of alternatives or mitigation measures. In a manner comparable to section 7 of the ESA, CEQA applies to actions taken undertaken, financed, or permitted by State lead agencies. Regulations for implementation are published in the State CEQA Guidelines, which establish an overall process for the environmental evaluation of projects that is similar to that promulgated under the National Environmental Policy Act (NEPA).

CEQA applies to certain activities of State and local public agencies. A public agency must comply with CEQA when it undertakes an activity defined by CEQA as a “project.” A project is an activity undertaken by a public agency or a private activity which must receive some discretionary approval from a government agency which may cause either a direct physical change in the environment or a reasonably foreseeable indirect change in the environment. Most proposals for physical development in California are subject to the provisions of CEQA, as are many governmental decisions which do not immediately result in physical development (such as adoption of a general or community plan). Every development project that requires discretionary governmental approval will likely require at least some environmental review pursuant to CEQA.<sup>51</sup>

Article 14 of CEQA applies to projects that are subject to both CEQA and NEPA. NEPA applies to projects which are carried out, financed, or approved in whole or in part by Federal agencies. Accordingly, this article applies to projects which involve one or more State or local agencies *and* one or more Federal agencies.

#### 4.2.4 SURFACE MINING AND RECLAMATION ACT OF 1975

The Surface Mining and Reclamation Act of 1975 (SMARA) was enacted by the California Legislature to address the need for a continuing supply of mineral resources, and to prevent or minimize the negative impacts of surface mining to public health, property, and the environment. The California State Office of Mine Reclamation provides technical assistance for lead agencies and operators, maintains a database of mine locations and operational information statewide, and is responsible for matters related to compliance. The State Mining and Geology Board is responsible for promulgating regulations to clarify

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<sup>51</sup> California Resources Agency, “California Environmental Quality Act: Frequently Asked Questions,” [http://ceres.ca.gov/topic/env\\_law/ceqa/more/faq.html](http://ceres.ca.gov/topic/env_law/ceqa/more/faq.html), accessed July 22, 2004.

and interpret the SMARA's provisions, and also serves as a policy and appeals board. The SMARA's requirements apply to anyone, including government agencies, engaged in surface mining operations in California (including those on Federally managed lands) which disturb more than one acre or remove more than 1,000 cubic yards of material. This includes, but is not limited to: prospecting and exploratory activities, dredging and quarrying, streambed skimming, borrow pitting, and the stockpiling of mined materials.<sup>52</sup>

By way of a Memorandum of Understanding with the California Department of Conservation, the BLM and the USFS have agreed that the statutes and regulations of SMARA are applicable to lands regulated by BLM and the USFS. Under the terms of the agreement, the local lead agency remains the lead agency and has the main responsibility to enforce the requirements of SMARA. Outside of Federal lands, city and county "lead agencies" adopt ordinances for land use permitting and reclamation procedures which provide the regulatory framework under which local mining and reclamation activities are conducted.

### **4.3 HABITAT CONSERVATION PLANS AND CONSERVATION PROGRAMS**

#### **4.3.1 SANTA ANA SUCKER CONSERVATION PROGRAM**

In the spring of 1999, an informal group of local, regional, State, and Federal agencies formed the Ad-Hoc Santa Ana Sucker Discussion Team (Discussion Team) to

"assist in reconciling economic activities with the conservation of the sucker and to identify and implement conservation measures that would contribute to the survival and recovery of the sucker, primarily within the SAR (Santa Ana River) watershed."<sup>53</sup>

As an outgrowth of initial studies and meetings, the Discussion Team proposed a Conservation Program for the SAS that is based upon a conservation plan authored by San Marino Environmental Associates and funded by the Santa Ana Watershed Project Authority.<sup>54</sup> The purpose of the Conservation Program is to promote survival and recovery of the SAS, while providing the necessary authorization to allow for the incidental take of SAS anticipated to occur when participating agencies implement certain actions.<sup>55</sup> The Service began consultation on the Conservation Program in January 2003. To date, the Conservation

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<sup>52</sup> California Office of Mine Reclamation, "Surface Mining and Reclamation Act of 1975: Frequently Asked Questions," <http://www.consrv.ca.gov/OMR/smara/faq.htm>, accessed July 22, 2004.

<sup>53</sup> Santa Ana Sucker Team, February 24, 2003, "Draft Conservation Program for the Santa Ana Sucker (*Catostomus santaanae*) within the Santa Ana River Watershed," p. 1.

<sup>54</sup> San Marino Environmental Associates, December 1999, "Conservation Program for the Santa Ana Sucker in the Santa Ana River, Southern California," Final Draft, prepared for the Santa Ana Watershed Project Authority.

<sup>55</sup> Santa Ana Sucker Team, February 24, 2003, "Draft Conservation Program for the Santa Ana Sucker (*Catostomus santaanae*) within the Santa Ana River Watershed," p. 1.

Program has not yet been approved nor has the Service issued a Biological Opinion; elements of the draft plan are discussed below. The initial participants would be comprised of seven public agency members and one program administrator. The seven members include: City of Riverside, City of San Bernardino, Orange County, Riverside County, San Bernardino County, Orange County Sanitation District, and Orange County Water District. The program administrator, Santa Ana Watershed Project Authority (SAWPA), hosts monthly meetings and administers the efforts of the team.

The member agencies' annual contributions fund efforts to implement the draft Santa Ana River Watershed Conservation Program. Table 4 provides a summary of past and current contributions to the program for each of the member agencies.

**Table 4**  
**Contributions of Participants to the**  
**Santa Ana River Watershed Conservation Program**

	<b>Contributions</b>				
<b>Participating Agency</b>	<b>2001-2002</b>	<b>2002-2003</b>	<b>2003-2004</b>	<b>2004-2005</b>	<b>Total</b>
City of Riverside	\$10,000	\$10,000	\$10,000	\$10,000	\$40,000
City of San Bernardino	\$10,000	\$10,000	\$10,000	\$10,000	\$40,000
Orange County	\$25,000	\$25,000	\$25,000	\$20,000	\$95,000
Riverside County	\$10,000	\$10,000	\$10,000	\$20,000	\$50,000
San Bernardino County	\$20,000	\$20,000	\$20,000	\$20,000	\$80,000
Orange County Sanitation District	\$15,000	\$15,000	\$15,000	\$15,000	\$60,000
Orange County Water District	\$25,000	\$25,000	\$25,000	\$20,000	\$95,000
<b>Program Administrator</b>					
Santa Ana Watershed Project Authority	\$25,000	\$25,000		\$10,000	\$60,000
<b>Total</b>	<b>\$140,000</b>	<b>\$140,000</b>	<b>\$115,000</b>	<b>\$125,000</b>	<b>\$520,000</b>

Source: Jeff Beehler at Santa Ana Watershed Project Authority, June 17, 2004.

In addition to the annual payments, the participants have developed minimization measures that each participating member has agreed to implement while performing certain activities in or near SAS habitat. These covered activities include operation, maintenance, repair, and reconstruction of existing projects and facilities and the continuation of existing programs for flood control, water conservation, water treatment and discharge, protection of transportation routes, and wildlife conservation. Minimization measures were developed from initial studies performed by consultants with some guidance and input from the Service and the California Department of Fish and Game. The conservation measures for specific activities of the member agencies are outlined and updated in the Conservation Program for the SAS within the Santa Ana River Watershed. Specific costs for project modifications and minimization measures will be detailed in Section 6.0 of this document.

The Conservation Program was established for an initial term of five years, commencing on the effective date of the Memorandum of Agreement (MOA). The MOA has not been signed, but the program is expected to gain approval by the Service in late 2004. Under the MOA, the participating members and the Service will prepare and approve an Annual Operating Plan for the coming year as well as evaluate and refine long-term goals and objectives for research and adaptive management.<sup>56</sup> Annual Operating Plans will commence on September 1 of each year, and expire on August 31 of the following year.

#### 4.3.2 WESTERN RIVERSIDE COUNTY MULTIPLE SPECIES HABITAT CONSERVATION PLAN

Riverside County, a participant in the Santa Ana Sucker Conservation Program, recently completed the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP), which includes the SAS as a covered species. The MSHCP is designed to create, manage and monitor a system of habitat preserves in Western Riverside County and provides a framework for complying with State and Federal endangered species regulations, while at the same time accommodating future growth.<sup>57</sup> The MSHCP was prepared pursuant to the ESA Section 10 (a)(1)(b), as well as the State's Natural Communities Conservation Plan (NCCP) Act, passed in 1991.

The MSHCP Plan area includes approximately 1.26 million acres and encompasses 14 incorporated cities as well as the unincorporated portions of western Riverside County. The Orange and San Bernardino County lines define the western boundary of the proposed Plan Area, while the San Bernardino and San Diego County lines form the northern and southern boundaries respectively. The eastern portion boundary of the MSHCP is formed by Banning Pass and the crest of the San Jacinto Mountains.

The SAS distribution in the MSHCP area is limited to a few locations. SAS are concentrated to a five to ten mile stretch of the Santa Ana River between the Riverside/San Bernardino County line and Van Buren Boulevard. The SAS is also found scattered throughout marginal habitat between Van Buren Boulevard and Prado Dam. There are also SAS present below Prado Dam; however the dam is a barrier to upstream migration so this area can be considered a sink, an aquatic zone with no outlet. These areas were excluded from the CHD based on the significant progress that had been made on the MSHCP at the time the Service published a final CHD. Although these areas are not designated as critical habitat, they are considered "essential habitat" for the SAS.

The MSHCP is a criteria-based plan, meaning a description of the conservation focus is provided for land units. Section 3.3 of the MSHCP identifies 16 area plans covered by the MSHCP with the criteria addressed by sub-unit. The SAS is mentioned as a species of concern in three subunits and corresponding area plans; Santa Ana River south of the Riverside/Norco area, Santa Ana River north of the Jurupa area,

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<sup>56</sup> Santa Ana Sucker Team, February 24, 2003, "Draft Conservation Program for the Santa Ana Sucker (*Catostomus santaanae*) within the Santa Ana River Watershed," p. 5.

<sup>57</sup> Riverside County, 2003, *Riverside County Integrated Project Multiple Species Habitat Conservation Plan (MSHCP)*, Volume 4 – Final EIR/EIS, Section 2.3 "Proposed Action."

and Santa Ana River near Eastvale. These three area plans make up what the MSHCP refers to as “Core A,” the lands of Prado Basin and Santa Ana River. The MSHCP describes this Core as being “constrained on all sides by existing urban development and agricultural use, and planned uses surrounding the Core consist largely of high impact land uses such as city and community development.” The MSHCP also mentions the following major covered activities potentially affecting the Core: SR-71, River Road, Hammer, I-15, Schleisman, Van Buren, Mission, and Market. Management entities in this Core include: the County of Riverside Parks and Open Space District, USACE, Orange County Water District, and California Department of Parks and Recreation.<sup>58</sup>

Section 9 of Volume I, and Volume II-B of the MSHCP describes in detail the conservation objectives, and conservation measures specifically related to the SAS. These measures are the responsibility of the management entities in Core A. The management objectives and conservation measures focus on including 3,480 acres of suitable habitat for the SAS, assessing barriers to SAS movement, and identifying measures to restore connectivity if feasible. Species specific conservation measures will also include assessing threats to SAS from degraded habitat, identification of necessary spawning areas, identification of areas for the creation of stream meanders, pool and riffle complexes, and establishment of native vegetation. The MSHCP Conservation Area also calls for reducing populations of non-native predatory fish species and bullfrogs where feasible.<sup>59</sup>

Section 5 of Volume I of the MSHCP estimates the Management and Monitoring Costs, and describes the Biological Monitoring Program. The anticipated level of effort to implement the biological monitoring program of the MSHCP is expressed in Personnel Years (PY) which represent 1,770 work hours. For Fish and Amphibian Surveys in the initial inventory and assessment phase, there are 3.5 PYs anticipated. However, during the long-term monitoring phase this increases to 4.5 PYs.<sup>60</sup> Altogether, there are five amphibian species and two fish species. The MSHCP was completed in four years for a cost in excess of \$11 million.<sup>61</sup> The MSHCP covers 146 species, 30 of which are Federally listed under the ESA. The costs attributable to the SAS are estimated by dividing the MSHCP development costs by the number of Federally listed species covered by the plan. This results in an estimated cost of approximately \$367,000 that can be attributed to the listing of the SAS.

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<sup>58</sup> Riverside County, 2003, *Riverside County Integrated Project Multiple Species Habitat Conservation Plan (MSHCP)*, Volume 1 – *The Plan*, Section 3 “Conservation Planning Process/Description and Area Plan Criteria of the MSHCP Conservation Area,” pp. 3-30 – 3-31.

<sup>59</sup> Riverside County, 2003, *Riverside County Integrated Project Multiple Species Habitat Conservation Plan (MSHCP)*, Volume 2 – *The MSHCP Reference Document*, Section B “Species Accounts - Fish – Santa Ana Sucker,” p. F-23.

<sup>60</sup> Riverside County, 2003, *Riverside County Integrated Project Multiple Species Habitat Conservation Plan (MSHCP)*, Volume 1 – *The Plan*, Section 5 “Management and Monitoring,” pp. 5-85 – 5-92.

<sup>61</sup> Personal communication with Ellen Showalter Laney, Riverside County, July 2004.

In Section 2.2.2.1, we described a general framework for estimating the costs of land use restrictions imposed by conservation measures associated with SAS on landowners and developers. The framework lays out procedures for estimating two types of economic effects on development: those associated with reductions in the supply of developable land and those associated with added development costs (project modifications). In this section, we apply the framework to estimate the costs to residential, commercial, and industrial development from payment of mitigation fees, conservation credits, and management and monitoring costs for habitat restoration, land set-aside, and/or off-site conservation for development mitigation imposed by the conservation actions for SAS. Below, we first discuss the data and assumptions and then present the estimation results for the costs associated with the SAS conservation measures.

## 5.1 THE COSTS OF MITIGATION ACTIVITIES

There are presently no land development restrictions or mitigation requirements for development in riparian areas within Los Angeles and San Bernardino counties, where the CHD is located. However, the mitigation ordinance structure established in the Riverside County MSHCP is used as a model for determining potential future costs of development in the critical habitat. Thus, the costs to residential and commercial development arising from the SAS conservation measures are estimated based on the assumption that development is allowed in the designated areas if an ordinance similar to that in Riverside County is established, which requires that appropriate mitigation activities be undertaken.<sup>62</sup> The mitigation activities for development include habitat restoration, land set-aside, and off-site conservation. The costs for these mitigation activities and the agencies' management and monitoring costs for habitat restoration are paid by developers or landowners. Although the land set-aside purchases are intended to protect habitat, the purchased land may be among those potentially developable, and therefore could displace some future housing.

The data on mitigation fees, costs of conservation credits, and management and monitoring costs were obtained from the MSHCP, discussed previously in Section 4.3.2. The MSHCP established the following development mitigation fees: \$1,651 per dwelling unit for residential development with density less than 8.0 dwelling units per acre; \$1,057 per dwelling unit for residential development with density between 8.1 and 14.0 dwelling units per acre; \$859 per dwelling unit for residential development with density greater than 14.0 dwelling units per acre; \$5,620 per acre for commercial and industrial development.<sup>63</sup> We assume that all new development must pay these fees.

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<sup>62</sup> Riverside County Ordinance 810.2, <http://www.tlma.co.riverside.ca.us/ordinances/ord810.2.html>, accessed July 2004.

<sup>63</sup> Riverside County Ordinance 810.2.

In addition, ongoing costs of management and monitoring have three components: management costs of \$55/acre/year, biological monitoring costs of \$21/acre/year, and program administration costs of \$12/acre/year.<sup>64</sup> Thus, the total annual cost for management and monitoring is \$88/acre/year, and is borne by taxpayers at large in each county. We apply the above mitigation fees and management and monitoring costs to new development in each SAS habitat unit.

We assume that no mitigation activities associated with the SAS occurred during the retrospective period (1999 to 2004). This is based on the finding that cities and counties interviewed did not have any past experience mitigating for new development affecting the SAS. In addition, no section 7 consultations involving development projects have occurred since the SAS listing. From 2004 to 2024 (the prospective period), it is assumed that all development in the critical habitat must pay mitigation fees or purchase land offsite for development mitigation. Annual management and monitoring costs are also included.

### 5.1.1 DEVELOPMENT PROJECTIONS

Projections on residential (low, medium and high densities), commercial, and industrial development in the designated area from 2004 to 2024 for use in the prospective cost estimation are made for each habitat unit based on population projections for the four affected counties. Population projections for each county from 2005 to 2030 were obtained from the California Department of Finance, Demographic Research Unit (see Table 5). Based on these population projections, the annual growth rates of population are then calculated for each county containing the habitat units. Acres of commercial, industrial, and residential (high-, medium-, and low-density) development in each year from 2004 to 2024 are then estimated for each habitat unit by assuming that commercial and residential development will grow at the same rate as population in the counties where each habitat unit is located.

**Table 5**  
**Population Projections in Counties Containing SAS Habitat**

County	2000	2010	2020	2030
Los Angeles	9,559,635	10,461,007	10,885,092	11,236,734
Orange	2,854,026	3,260,162	3,526,144	3,665,343

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<sup>64</sup> Riverside County, 2003, *Riverside County Integrated Project Multiple Species Habitat Conservation Plan (MSHCP)*, Volume 1 – *The Plan*, Section 8.0 “MSHCP Funding/Financing of Reserve Assembly and Management,” pp. 8-5 – 8-7.

Riverside	1,553,902	2,165,148	2,675,648	3,180,411
San Bernardino	1,719,615	2,133,377	2,456,089	2,762,307

Source: California Department of Finance, Demographic Research Unit.

### 5.1.2 ESTIMATION RESULTS: COSTS OF MITIGATION ACTIVITIES

The costs to residential, commercial, and industrial development as a result of paying mitigation fees, conservation credits, and management and monitoring costs for habitat restoration, land set-aside, and/or off-site conservation for development mitigation for the SAS conservation activities are estimated using the data and assumptions discussed above. The estimation procedure is described below.

**Step 1:** Estimate the current acreage of low-density residential (LR), medium-density residential (MR), high-density residential (HR), commercial (C), and industrial (I) development with the CHD and EL. This was accomplished through the use of GIS analysis of land use data. The Southern California Association of Governments (SCAG) maintains GIS data describing land use in Los Angeles, Riverside, Orange, and San Bernardino Counties for 2000 and 2001.<sup>65</sup> This GIS data was intersected with the CHD and EL to describe land use within the affected region. The SCAG land use categories were aggregated to the five categories mentioned above. Table 6 details the aggregation of the SCAG land use classes.

**Step 2:** Estimate the acreage of low-density residential, medium-density residential, high-density residential, commercial, and industrial development in each year from 2004 to 2024 based on current land use and population. Acreage for each land use category within the CHD and EL were estimated through GIS analysis. Table 7 presents the acreage by current land use category within each habitat unit. (Unit 2 – San Gabriel River was eliminated from this analysis, as it is located entirely within the Angeles National Forest.) Projected population growth rates for each county containing CHD and EL were applied to the current acreage estimates within each land use category to estimate annual development throughout the prospective analysis period (2004 to 2024). Table 8 provides the population growth rates applied to the CHD and EL by county and time period. Table 9 presents the average number of acres per year that are forecasted to be developed. Development is assumed to continue in the same proportion as the current land use within each habitat unit.

**Step 3:** Estimate the costs of mitigating activities for each type of development. Mitigation costs were obtained from the Western Riverside MSHCP and include a one-time fee based upon development type as well as ongoing management and monitoring of habitat set aside for the SAS. Table 10 provides a summary of the mitigation costs applied in this analysis. The mitigation fee ranges from \$5,620 to \$17,180 per acre. The annual management and monitoring costs are \$88 per acre, which includes management costs (\$55), biological monitoring (\$21), and program administration (\$12).

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<sup>65</sup> Southern California Association of Governments, Region Land Use - 2000, [www.scag.ca.gov](http://www.scag.ca.gov).

**Step 4:** Estimate the present value of mitigation costs from 2004 to 2024 in each habitat unit using data developed in the above steps. The annual costs are discounted using discount rates of three and seven percent.

**Table 6**  
**Aggregation of SCAG Land Use Data**

<b>SCAG Land Use Classification</b>	<b>C</b>	<b>I</b>	<b>RH</b>	<b>RL</b>	<b>RM</b>
Airports	X				
Commercial Recreation	X				
Commercial Storage	X				
Communication Facilities	X				
Correctional Facilities	X				
Electrical Power Facilities		X			
Fire Stations		X			
Former Base (Built-up Area)		X			
Former Base Air Field		X			
Former Base Vacant Area		X			
Freeways and Major Roads	X				
Golf Courses	X				
Government Offices	X				
High-Density Single Family Residential			X		
Liquid Waste Disposal Facilities	X				
Low- and Medium-Rise Major Office Use	X				
Low-Density Single Family Residential				X	
Low-Rise Apartments, Condominiums, and Townhouses			X		
Maintenance Yards	X				
Manufacturing, Assembly, and Industrial Services		X			
Mixed Commercial and Industrial		X			
Mixed Transportation	X				
Mobile Home Courts and Subdivisions, Low-Density			X		
Modern Strip Development	X				
Natural Gas and Petroleum Facilities	X				
Open Storage	X				
Other Public Facilities	X				
Poultry Operations		X			
Religious Facilities	X				
Research and Development	X				
Retail Centers (Non-Strip With Contiguous Interconnected Off-Street)	X				
Rural Residential, High-Density					X
Rural Residential, Low-Density				X	
Solid Waste Disposal Facilities	X				
Special Care Facilities	X				
Trade Schools and Professional Training Facilities	X				
Trailer Parks and Mobile Home Courts, High-Density	X		X		
Truck Terminals	X				
Under Construction			X		
Water Storage Facilities	X				
Water Transfer Facilities	X				

**Table 7**  
**Acreage by Current Land Use Category and Habitat Unit**

<b>Land Use Category</b>	<b>Unit 1A - Northern Prado Basin</b>	<b>Unit 1B - Santa Ana Wash</b>	<b>Unit 3 - Big Tujunga Creek</b>	<b>Essential Habitat</b>		
				<b>Orange County</b>	<b>Riverside County</b>	<b>San Bernardino County</b>
Residential, Low Density (RL)	16.1	81.0	120.4	-	27.1	-
Residential, Medium Density (RM)	-	3.7	0.4	-	-	-
Residential, High Density (RH)	40.7	108.4	25.6	0.3	9.8	-
Commercial	214.9	233.1	67.6	127.3	520.7	30.8
Industrial	24.7	122.1	21.4	-	1.0	-
<b>TOTAL</b>	<b>296.3</b>	<b>548.3</b>	<b>235.3</b>	<b>127.6</b>	<b>558.6</b>	<b>30.8</b>

Note: Totals may not sum precisely due to rounding.

**Table 8**  
**Projected Annual Population Growth Rates in Counties Containing SAS Habitat**

<b>County</b>	<b>2004-2010</b>	<b>2011-2020</b>	<b>2021-2024</b>
Los Angeles	0.91%	0.40%	0.32%
Orange	1.34%	0.79%	0.39%
Riverside	3.37%	2.14%	1.74%
San Bernardino	2.18%	1.42%	1.18%

Note: Unit 1A – Northern Prado Basin and Unit 1B – Santa Ana Wash are located entirely in San Bernardino County. Unit 3 – Big Tujunga Creek is located in Los Angeles County.

**Table 9**  
**Forecasted Development by Habitat Unit,**  
**Average Number of Acres per Year**

<b>Habitat Unit</b>	<b>Acres per Year</b>
Unit 1A – Northern Prado Basin	4.9
Unit 1B – Santa Ana Wash	9.0
Unit 2 – San Gabriel River	0.0
Unit 3 – Big Tujunga Creek	1.3
<b>Total CHD</b>	<b>15.3</b>
Excluded Land (Essential Habitat)	15.3

Note: Totals may not sum precisely due to rounding. Total for each the CHD and Excluded Lands are coincidentally equal.

**Table 10**  
**Per Acre Mitigation and Monitoring Costs by Land Use Category**

<b>Land Use Category</b>	<b>Mitigation Fee (\$/acre)</b>	<b>Annual Management and Monitoring Costs (\$/acre/year)</b>
Residential, Low Density (RL)	\$8,255	\$88
Residential, Medium Density (RM)	\$10,570	\$88
Residential, High Density (RH)	\$17,180	\$88
Commercial	\$5,620	\$88
Industrial	\$5,620	\$88

Source: Riverside County, 2003, *Riverside County Integrated Project Multiple Species Habitat Conservation Plan (MSHCP), Volume 1 – The Plan*, <http://www.rcip.org/mshcpdocs/vol1/mshcpvol1toc.htm>; and Riverside County Ordinance 810.2, <http://www.tlma.co.riverside.ca.us/ordinances/ord810.2.html>, accessed July 2004.

The estimated costs of conservation measures for the SAS for residential, commercial, and industrial development are summarized in Table 11. As described above, no retrospective costs were assigned to new development. The second and third columns of Table 11 report the prospective costs from 2004 to 2024 using discount rates of three percent and seven percent, respectively. The last column reports the annual cost for each habitat unit.<sup>66</sup> Based on the projected acres and units of development from 2004 to 2024, for a discount rate of three percent, we estimate that the costs for residential, commercial, and

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<sup>66</sup> Annual costs are estimated by considering the average annual growth rate over the period 2004 to 2024. This is used as the basis for estimating the prospective annual mitigation cost. This is in contrast to the prospective costs, which consider the growth rates as forecasted by the California Department of Finance, which vary by ten-year periods.

industrial development will increase by approximately \$1.9 million dollars. Estimated costs increase by \$1.5 million using a seven percent discount rate. Mitigation costs on land excluded from the CHD are estimated to be \$1.5 million and \$1.2 million using a three and seven percent discount rate, respectively. Among the habitat units, Unit 1B, Santa Ana Wash, has the largest prospective costs. Unit 1B, Santa Ana Wash, currently contains the largest amount of developed land among the four habitat units and is projected to experience the largest amount of development in the next 20 years. Conversely, Unit 2, San Gabriel River, is located entirely within the Angeles National Forest and is expected to have no new development in the next 20 years. Annualized costs for land in the CHD are approximately \$122,000. Annualized costs for lands excluded from the CHD are estimated to be \$90,000.

**Table 11**  
**Potential Mitigation Costs to New Development, by Habitat Unit**

Habitat Unit	Retrospective (Total)	Prospective (Total)		Prospective Annual
		3%	7%	
Unit 1A – Northern Prado Basin	\$0	\$571,000	\$441,000	\$36,000
Unit 1B – Santa Ana Wash	\$0	\$1,197,000	\$925,000	\$75,000
Unit 2 – San Gabriel River	\$0	\$0	\$0	\$0
Unit 3 – Big Tujunga Creek	\$0	\$179,000	\$143,000	\$11,000
<b>Total CHD</b>	<b>\$0</b>	<b>\$1,946,000</b>	<b>\$1,509,000</b>	<b>\$122,000</b>
Excluded Land (Essential Habitat)	\$0	\$1,486,000	\$1,153,000	\$90,000

Note: Numbers may not sum due to rounding.

The prospective management and monitoring costs to development activities due to SAS listing and CHD for the 20 year prospective period are shown in Table 12. Among the habitat units, Unit 1B, Santa Ana Wash, incurs the largest amount of management and monitoring costs, as it contains the most developable land among the four critical habitat units and is expected to experience the largest amount of development in the next 20 years.

**Table 12**  
**Management and Monitoring Costs for Habitat Restoration to Mitigate**  
**Prospective Development Impacts, by Habitat Unit**

Habitat Unit	Retrospective (Total)	Prospective (Total)		Prospective Annual <sup>a/</sup>
		3%	7%	
Unit 1A – Northern Prado Basin	\$0	\$71,000	\$47,000	\$5,000
Unit 1B – Santa Ana Wash	\$0	\$132,000	\$87,000	\$9,000
Unit 2 – San Gabriel River	\$0	\$0	\$0	\$0
Unit 3 – Big Tujunga Creek	\$0	\$21,000	\$14,000	\$1,000
<b>Total CHD</b>	<b>\$0</b>	<b>\$224,000</b>	<b>\$147,000</b>	<b>\$16,000</b>
Excluded Land (Essential Habitat)	\$0	\$231,000	\$152,000	\$16,000

a/ Annual costs are estimated by considering the average annual growth rate over the period 2004 to 2024. This is used as the basis for estimating the prospective annual cost. This is in contrast to the prospective costs, which consider the growth rates as forecasted by the California Department of Finance, which vary by ten-year periods.

Note: Numbers may not sum due to rounding.

Table 13 combines the costs attributable to the one-time mitigation fee presented earlier in Table 11 with the annual costs of mitigation and monitoring provided earlier in Table 12.

**Table 13**  
**Potential Economic Impacts to Residential and Commercial Development**

Habitat Unit	Retrospective (Total)	Prospective (Total)		Prospective Annual
		3%	7%	
Unit 1A – Northern Prado Basin	\$0	\$642,000	\$488,000	\$41,000
Unit 1B – Santa Ana Wash	\$0	\$1,328,000	\$1,012,000	\$85,000
Unit 2 – San Gabriel River	\$0	\$0	\$0	\$0
Unit 3 – Big Tujunga Creek	\$0	\$200,000	\$157,000	\$12,000
<b>Total CHD</b>	<b>\$0</b>	<b>\$2,169,000</b>	<b>\$1,656,000</b>	<b>\$138,000</b>
Excluded Land (Essential Habitat)	\$0	\$1,717,000	\$1,305,000	\$107,000

Note: Numbers may not sum due to rounding.

## 6.1 CONTRIBUTIONS TO THE SAS CONSERVATION PROGRAM

The SAS Conservation Program (described previously in Section 4.3.1) includes participants from eight agencies that do work in or around the Santa Ana River, and are concerned about the recovery of the SAS. Yearly contributions from each agency are used to promote survival and recovery of the SAS. The Conservation Program also provides the necessary authorization to allow for the potential incidental take of SAS anticipated when participating agencies implement certain actions. In addition to the annual payments, the participants have developed minimization measures that each participating member has agreed to implement while performing activities in or near SAS habitat. The specific costs for project modifications and minimization measures are detailed in the below.

### 6.1.1 RETROSPECTIVE PROJECT COSTS (1999-2004)

Retrospective costs for the SAS Conservation Program include the past contributions made by each of the agencies. Section 4.3.1 includes a list of past contributions. All costs are attributed to EL.

### 6.1.2 PROSPECTIVE COSTS (2004-2024)

Prospective costs for the SAS Conservation Program include only the future contributions that are likely to be made by each of the eight different agencies. In this analysis, future contributions are assumed to continue at current levels for each agency except the program administrator (SAWPA). For this analysis, we assume SAWPA's contribution to be the average of previous annual contributions, or \$15,000 per year. All costs are attributed to EL. Table 14 shows the prospective annual costs for the conservation program of each agency.

### 6.1.3 ESTIMATED COSTS

Retrospective and prospective costs associated with the annual contributions to the Santa Ana Sucker Conservation Program are summarized in Table 15.

**Table 14**  
**Prospective Costs by Agency**

<b>Participating Agency</b>	<b>Cost</b>
City of Riverside	\$10,000
City of San Bernardino	\$10,000
Orange County	\$20,000
Riverside County	\$20,000
San Bernardino County	\$20,000
Orange County Sanitation District	\$15,000
Orange County Water District	\$20,000
<b>Program Administrator</b>	
Santa Ana Watershed Project Authority	\$15,000
<b>Total</b>	<b>\$130,000</b>

**Table 15**  
**Potential Economic Costs to the SAS Conservation Program**

<b>Habitat Unit</b>	<b>Retrospective (Total)</b>	<b>Prospective (Total)</b>		<b>Prospective (Annual)</b>
		<b>3%</b>	<b>7%</b>	
Unit 1A – Northern Prado Basin	\$0	\$0	\$0	\$0
Unit 1B – Santa Ana Wash	\$0	\$0	\$0	\$0
Unit 2 – San Gabriel River	\$0	\$0	\$0	\$0
Unit 3 – Big Tujunga Creek	\$0	\$0	\$0	\$0
<b>Total CHD</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
Excluded Lands (Essential Habitat)	\$520,000	\$1,934,000	\$1,377,000	\$130,000

## **6.2 EFFECTS ON COMMERCIAL MINING OPERATIONS**

Sand and gravel are important resources in southern California that support development activities such as residential and commercial construction and road building. In 2002, 362 sand and gravel operations produced 157.0 million metric tons with a value of \$1.2 billion in California.<sup>67</sup> Due to the costs of transporting the material, sand and gravel mines tend to be located in areas relatively near development. Some of these mines have historically been, and continue to be located within flood plains and can directly impact SAS habitat.

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<sup>67</sup> Bolon, W.P., 2003, "Construction Sand and Gravel," United States Geological Survey.

Sand and gravel extraction methods vary widely across mine locations and operations and typically depend upon the nature of the deposit and operator preference. Where mining occurs above the water table, conventional earth moving equipment is often employed. In cases where the mine penetrates the water table, draglines or floating barges using hydraulic methods are often used. Excavation typically occurs during periods of low water levels so that the sand and gravel can be replenished during periods of high flows.

The environmental impacts of sand and gravel mining vary widely by location and extraction method but can include erosion, loss of habitat, and degradation of water quality. A primary impact associated with mining activities in or near streams arises from the removal of more gravel than can naturally be replenished by the system.<sup>68</sup> Excess gravel removal can cause changes in the channel and flow resulting in degradation of habitat conditions for aquatic species, including the SAS. One measure taken to minimize the impact of sand and gravel mining from active river channels includes restricting sand and gravel extraction rates to the amount of sediment that is transported by the stream during a given period.<sup>69</sup> Other measures include locating settling ponds for sand and gravel wash water away from the waterway to prevent the water from entering the stream, and timing extraction to avoid fish spawning periods.

Sand and gravel mining in California on BLM and USFS land is primarily regulated through the California Surface Mining and Reclamation Act (1975). Outside of Federal lands, city and county “lead agencies” adopt ordinances for land use permitting and reclamation procedures which provide the regulatory framework under which local mining and reclamation activities are conducted. This regulation can vary by local jurisdiction. The USACE also regulates sand and gravel mining in flood plains through sections 401 and 404 of the Clean Water Act (Title 33), or under section 10 of the Rivers and Harbors Act of 1899. However, not all mines within flood plains are required to apply for a USACE permit.

The consultation record for the SAS includes one emergency consultation associated with sand and gravel excavation from the Santa Ana River. However, this consultation is primarily related sand and gravel removal activities to protect a bridge from damage during high water events and therefore is considered in the analysis of SAS listing and CHD effects on road maintenance and transportation (Section 6.5). No consultations of ongoing commercial sand and gravel operations have occurred since the SAS listing.

The SAS CHD was developed to exclude existing mining operations. In addition, existing mining operations will not be required to implement SAS conservation measures provided the operation does not expand mining activities or deviate from past practices.<sup>70</sup> However, new mining operations will likely be

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<sup>68</sup> Langer, W. H., 2002, “A General Overview of the Technology of In-Stream Mining of Sand and Gravel Resources, Associated Potential Environmental Impacts, and Methods to Control Potential Impacts,” U.S. Geological Survey Open-File Report OF-02-153.

<sup>69</sup> Ibid.

<sup>70</sup> Personal communication with Service Biologist, Carlsbad Fish and Wildlife Office, July 2004.

affected by the SAS listing if they are located within SAS habitat or will affect downstream SAS habitat.<sup>71</sup>

The City of Redlands is one of a number of local agencies and private companies that are involved in the initial stages of preparing a mining plan and HCP for Unit 1B, Santa Ana Wash. This area currently contains several existing sand and gravel mines. The mining plan and HCP are being prepared to accommodate future expansion of mining activities in the area which contains habitat for the Federally endangered San Bernardino kangaroo rat, Santa Ana River woolly-star and slender-horned spineflower.<sup>72</sup> The HCP does not currently include the SAS but is likely to in the future. Development of the HCP is in early stages and costs incurred to date are minimal.

Future mining activities in the area will supply an important source of materials needed for new development. In addition, royalties from the mining provide local governments with a source of revenues. Reductions in allowed mining activity would increase the costs of new development and reduce royalty collections by local agencies.

While it is apparent that new mining is planned within SAS habitat, it is not possible to predict how it may be affected by conservation measures for the SAS. This is due in part to the lack of past consultations of sand and gravel mining for the SAS. In addition, we were unable to identify future conservation measures that may be imposed on the activity. Last, information concerning the level of planned mining activities was unavailable for this report. As a result of these factors, this analysis does not assess any costs to future sand and gravel mining activities within SAS habitat.

## **6.3 EFFECTS ON UTILITIES**

### **6.3.1 WATER TREATMENT FACILITIES**

Before wastewater is released back into any body of water it must undergo treatment. Without this treatment the wastewater would pollute and degrade surface waters, making them unsafe for drinking, fishing, swimming, and other activities. The Clean Water Act authorizes the NPDES permit program to control water pollution by regulating point sources that discharge pollutants into waters of the United States. Point sources are distinct sources of pollution such as pipes or man-made ditches. Industrial, municipal, and other facilities are required to obtain permits if their discharges go directly to surface waters. The NPDES permit program was first introduced in 1972 and is administered by authorized states.<sup>73</sup> California has a State NPDES permit program, a State pretreatment program, a general permits

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<sup>71</sup> Ibid.

<sup>72</sup> Personal communication with John Jaquess, City of Redlands, July 2004.

<sup>73</sup> U.S. Environmental Protection Agency, December 8, 2003 (last updated), "National Pollutant Discharge Elimination System (NPDES)," <http://cfpub2.epa.gov/npdes/>.

program, and is approved to regulate Federal facilities. The NPDES permit for the wastewater facilities discharging effluent to the Santa Ana River is administered by the California Regional Water Quality Control Board (Region Number 8). This analysis considers nine facilities that discharge effluent into, or upstream of, SAS CHD and EL.

### 6.3.1.1 Rapid Infiltration and Extraction (RIX) Facility

In March of 1996, the cities of Colton and San Bernardino wastewater treatment plants jointly opened the Rapid Infiltration and Extraction (RIX) facility. At RIX, secondary treated water undergoes the final filtering and disinfecting process. The final product is wastewater that is superior or at least equivalent to those produced by conventional filtration systems. The water reclamation plant includes a secondary treatment facility that has a capacity of 33 MGD and serves a population of over 185,000 people. The RIX service area includes the City of San Bernardino, Loma Linda, East Valley, San Bernardino International Airport, Patton State Hospital, and parts of San Bernardino County. The facility has 75 employees and operates 24 hours a day, seven days a week.<sup>74</sup>

The Santa Ana River reach downstream of the RIX facility is prime SAS habitat due to the flow created from the discharge of treated water. The RIX facility discharges water to the Santa Ana River according to a contractual agreement with San Bernardino Valley Municipal Water District (SBVMWD).<sup>75</sup> The over commitment of water during the 1960s in the Santa Ana River watershed led to lawsuits over the use of surface flows and groundwater. The lawsuits culminated in 1969 in two major judgments; *Orange County Water District v. City of Chino, et al.*, and *Western Municipal Water District, et al. v. East San Bernardino County Water District, et al.* The terms of the settlements called for SBVMWD to deliver supplemental water to offset the deficiency. The judgments resolved the major water rights issues that had prevented the development of long-term area wide water supply plans. The SBVMWD is legally required to maintain a flow equivalent to approximately 15,250 acre-feet per year at Riverside Narrows on the Santa Ana River.<sup>76</sup>

SBVMWD and the agency operating the RIX facility (San Bernardino Wastewater Treatment) are separate agencies. However, SBVMWD has a contract with the cities of San Bernardino, Rialto, and Colton to use the treated effluent to satisfy the above mentioned court mandate. In the past, more than the required volume of recycled water was discharged into the river (about 25,000 acre-feet per year). As a result, SBVMWD has accrued a credit of 465,863 acre-feet.<sup>77</sup> The district could potentially use these

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<sup>74</sup> City of San Bernardino Municipal Water Department, "Water Reclamation," [http://www.sbcitywater.org/Water\\_Rec/wtrecdef.htm](http://www.sbcitywater.org/Water_Rec/wtrecdef.htm) and [http://www.sbcitywater.org/Water\\_Rec/History.htm](http://www.sbcitywater.org/Water_Rec/History.htm).

<sup>75</sup> Personal communication with Stacey Aldstadt, Deputy General Manager of San Bernardino Municipal Water Department and Chairman of the SAS Team, July 11, 2004.

<sup>76</sup> San Bernardino Valley Municipal Water District, "About the District," <http://www.sbvmd.com/About%20Pages/aboutthe.htm>.

<sup>77</sup> Ibid.

credits to meet its legal obligation during dry years, provided that at least 12,420 acre-feet are provided at Riverside Narrows.<sup>78</sup>

RIX produces recycled water in amounts well above the contracted amount with SBVMWD (about 40,000 acre feet annually) and would like to start marketing and selling its high quality recycled water. To explore the potential impacts of this marketing program an EIR has been developed. The conclusion of the EIR was that the program would not harm the SAS. RIX is proposing to sell up to 18,000 acre-feet per year of water that has historically been discharged into the river. The Service has expressed concern that the reduction in flow proposed by the program will harm the SAS.<sup>79</sup> Currently, it is unclear if the proposed water sales program will proceed as presented in the EIR. Furthermore, the Service has not yet consulted on the program and, as a result, it is difficult to determine the conservation measures that the Service may require, if any. According to a Service biologist, the RIX facility could still market the water even if it were required to discharge it to the river. However, the market area would be more limited.<sup>80</sup> Due to these factors, this analysis does not assess any costs associated with potential changes to the RIX water sales program.

The RIX facility is represented by the City of San Bernardino Municipal Water Department (SBMWD) as a member of the SAS Conservation Program. Each year, SBMWD contributes \$10,000 to help fund surveying, monitoring and reporting on the SAS to develop an understanding of the environmental factors that have contributed to the decline of SAS.<sup>81</sup> Contributions to the SAS Conservation Program are considered in Section 6.1.

#### 6.3.1.2 City of Riverside (Regional Water Quality Control Plant)

The City of Riverside operates a Regional Water Quality Control Plant that is responsible for treating the wastewater generated by the city before tertiary treated flows are conveyed to wetlands. The conveyance system is an earth and sand channel instead of a pipeline because the substrate is composed of sand for 150 feet below the surface and does not provide the stability needed for pipeline placement. A 2,000 foot portion of this channel is protected by a sand dike directly adjacent to the Santa Ana River. The dike presents a barrier between effluent flow and the “natural” river flow. During storm flows and storm drainages the Santa Ana River washes out the dike. When the dike is breached by high flows or

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<sup>78</sup> U.S. Environmental Protection Agency, December 8, 2003 (last updated), “National Pollutant Discharge Elimination System (NPDES),” <http://cfpub2.epa.gov/npdes/>.

<sup>79</sup> U.S. Fish and Wildlife Service, April 29, 2003, “Comments on the Program Environmental Impact Report for the Regional Rapid Infiltration and Extraction Facility Recycled Water Sales Program – SCH #99101088,” FWS-SB-3061.3.

<sup>80</sup> Personal communication with Service Biologist, Carlsbad Fish and Wildlife Office, August 11, 2004.

<sup>81</sup> Personal communication with Jeff Beehler, Environmental Project Manager, Santa Ana Watershed Project Authority, June 25, 2004.

otherwise compromised, it is rebuilt with sand from the main channel using a tracker dozer after the storm flows recede. This occurs six to ten times per year, and requires approximately three days to complete.<sup>82</sup>

The City of Riverside is also a member of the SAS Conservation Program and contributes \$10,000 annually to the Program (see Section 6.1).<sup>83</sup> The conservation measures outlined in the SAS Conservation Program require the City of Riverside to sweep the area with seine nets before dike maintenance activities, and relocate the SAS within four hours of capture. A biologist is required to be on site during the maintenance activities as well.<sup>84</sup>

### 6.3.1.3 Cost Estimation Methodology of Water Treatment Facilities

The costs of implementing conservation measures were determined through interviews and correspondence between the San Bernardino Water Department (operators of the RIX facility) and the City of Riverside. Two main categories of costs associated with the SAS – “surveying and monitoring” and “removal and relocation” – are described in detail below.

#### Surveying and Monitoring

Recently, the RIX facility and the Service participated in a study to determine adverse effects, if any, of discharge shutdowns on the SAS. The analysis was finalized in August 2002 and determined that the emergency shutdowns do not harm the SAS.<sup>85</sup> Financing for biologists and the study were paid from the Conservation Program’s funds.

During dike maintenance events at the City of Riverside’s facility, a biologist must be on site to monitor the captured fish and record data, such as physical condition, gender, and any presence of external lesions or parasites. Having a biologist on site during the maintenance work has not happened in past events but will be required in the future. It is anticipated that this will cost the city \$85 per hour. Assuming annual dike reconstruction requires 18 days (144 hours), monitoring costs would total \$12,240 per year.<sup>86</sup>

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<sup>82</sup> Santa Ana Sucker Team, February 24, 2003, “Draft Conservation Program for the Santa Ana Sucker (*Catostomus santaanae*) within the Santa Ana River Watershed,” Section E - City of Riverside (Regional Water Quality Control Plant), pp. 20-21.

<sup>83</sup> Personal communication with Jeff Beehler, Environmental Project Manager, Santa Ana Watershed Project Authority, June 17, 2004.

<sup>84</sup> Santa Ana Sucker Team, February 24, 2003, “Draft Conservation Program for the Santa Ana Sucker (*Catostomus santaanae*) within the Santa Ana River Watershed,” Section E - City of Riverside (Regional Water Quality Control Plant), pp. 20-21.

<sup>85</sup> Personal communication with Stacey Aldstadt, Deputy General Manager of San Bernardino Municipal Water District and Chairman of the Sucker Team, July 14, 2004.

<sup>86</sup> Personal communication with Rod Cruze, City of Riverside, July 12, 2004.

## Removal and Relocation

The City of Riverside removes any SAS in the work area by sweeping the area with seine nets prior to conducting rebuilding activities on the sand dike between September 30<sup>th</sup> and May 1<sup>st</sup> of each year. If a SAS is captured, it is retained in an insulated, aerated, and covered container. The SAS must be relocated within four hours of capture to appropriate areas in the vicinity or other locations as specified by the Service.<sup>87</sup> This minimization measure is required and implemented by the City of Riverside as part of their involvement in the SAS Conservation Program.

Assuming that there are six dike repairs required between September 30<sup>th</sup> and May 1<sup>st</sup>, and an average of three days are needed per event, a total of 18 days would require removal and relocation of the SAS from the work area.<sup>88</sup> It takes four workers approximately four hours per day to mobilize, set up, and take down the seine nets. The cost to the City of Riverside has been estimated at \$40 per hour per person in the form of salary and benefits. Over the course of 18 days (288 total man-hours) the labor costs associated with netting would equal \$11,520 per year. Equipment costs in the form of vehicles, nets, safety equipment, and other items account for \$100 dollars per day, or \$1,800 per year. Total project modification expenses (sweeping, equipment and biologists) related to protecting the SAS total \$25,560 per year.<sup>89</sup>

Table 16 provides a summary of the costs of SAS conservation measures at the City of Riverside water treatment facility.

**Table 16**  
**Estimated Costs of Conservation Measures at**  
**City of Riverside Water Treatment Facility**

<b>Activity</b>	<b>Annual Costs</b>
Sweeping Nets	\$11,520
Equipment	\$1,800
Biologist (Monitoring)	\$12,240
<b>Total</b>	<b>\$25,560</b>

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<sup>87</sup> Santa Ana Sucker Team, February 24, 2003, "Draft Conservation Program for the Santa Ana Sucker (*Catostomus santaanae*) within the Santa Ana River Watershed," Section E - City of Riverside (Regional Water Quality Control Plant), pp. 20-21.

<sup>88</sup> Santa Ana Sucker Team, February 24, 2003, "Draft Conservation Program for the Santa Ana Sucker (*Catostomus santaanae*) within the Santa Ana River Watershed," Section E - City of Riverside (Regional Water Quality Control Plant), pp. 20-21.

<sup>89</sup> Personal communication with Rod Cruze, City of Riverside, July 12, 2004.

#### 6.3.1.4 Retrospective Project Costs (1999-2004)

Retrospective costs for water treatment facilities include the cost of modifications for dike maintenance activities incurred by the City of Riverside over the past two years. The estimate includes only an assessment of costs associated with sweeping and equipment. The cost for biologist time has not been incurred in past dike repair events.

#### 6.3.1.5 Prospective Project Costs (2004–2024)

Every three years the Regional Water Quality Control Board updates the Santa Ana Basin Plan, which describes the beneficial uses of the Santa Ana River and sets the quality standards to maintain those uses. The next update is set for 2005, and it is anticipated that the Service will recommend water quality objectives for monitoring NPDES discharge specifically for the SAS.<sup>90</sup>

Inland Empire Utilities Agency operates two facilities (Chino Basin Regional Plant No. 5 and Carbon Canyon WTP) in Unit 1A, Northern Prado Basin. San Bernardino WRP and Redlands WWTP are also directly adjacent to Unit 1B, Santa Ana Wash. Three other facilities (Rialto WWTP, Corona WWTP #1, and Western Riverside County WWTP) are located in the EL and are not currently involved with the SAS Conservation Program. This analysis assumes that these seven facilities will incur costs associated with surveying and monitoring the SAS in their respective Habitat Units. It is likely that these facilities will be required to consult with the Service in the future concerning the SAS. In this analysis, it is assumed that each facility incurs costs associated with surveying and monitoring the SAS and that this cost begins immediately and continues throughout the prospective analysis period (20 years).

The City of Riverside has the only earth and sand conveyance system and therefore was the only water treatment facility assigned costs for conservation measures associated with sand dike repair. The measures implemented by the City of Riverside are mandated through their participation in the SAS Conservation Program. The costs incurred by the City of Riverside facility are anticipated to be higher than the other facilities considered in this analysis. To account for this, the other seven facilities were assessed costs of \$10,000 per year based upon the annual contributions to the SAS Conservation Program currently paid by the RIX facility and City of Riverside. Discount rates of three and seven percent were applied to calculate the present value of the prospective costs for each facility.

#### 6.3.1.6 Estimated Costs

Table 17 provides a summary of the estimated costs to water treatment facilities by SAS habitat unit.

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<sup>90</sup> U.S. Fish and Wildlife Services, March 31, 2003, Letter from Carlsbad Fish and Wildlife Office to California Regional Water Quality Control Board, Santa Ana Region, Attn: Joanne E. Schneider, Environmental Manager.

**Table 17**  
**Potential Economic Costs to Water Treatment Facilities**

Habitat Unit	Retrospective (Total)	Prospective (Total)		Prospective (Annual)
		3%	7%	
Unit 1A – Northern Prado Basin	\$0	\$298,000	\$212,000	\$20,000
Unit 1B – Santa Ana Wash	\$0	\$298,000	\$212,000	\$20,000
Unit 2 – San Gabriel River	\$0	\$0	\$0	\$0
Unit 3 – Big Tujunga Creek	\$0	\$0	\$0	\$0
<b>Total CHD</b>	<b>\$0</b>	<b>\$595,000</b>	<b>\$424,000</b>	<b>\$40,000</b>
Excluded Lands (Essential Habitat)	\$27,000	\$827,000	\$589,000	\$56,000

Note: Numbers may not sum due to rounding.

#### 6.3.1.7 Assumptions and Uncertainties

**Table 18**  
**Assumptions and Uncertainties**

Assumption	Direction of Bias
Water treatment facilities outside of the CHD and EL areas will not incur costs due to the SAS	-
All water treatment facilities within the CHD and EL areas for SAS will incur costs associated with surveying and monitoring	+
Costs incurred at the RIX and Riverside facilities are representative of costs that will be incurred at other water treatment facilities	+/-

+: This assumption is likely to produce an upward bias in cost estimates.

-: This assumption is likely to produce a downward bias in cost estimates.

+/-: No direction of bias can be determined.

#### 6.3.2 SARI LINE

The State Water Resources Control Board and nine other regional water quality control boards are responsible for the protection and enhancement of California's water quality. One of the most serious problems that they face is the buildup of salt in surface waters and ground waters and the associated

adverse effects.<sup>91</sup> Brine (water containing salts) entering the Santa Ana River has the potential to percolate into Orange County's groundwater basin and contaminate the water being pumped from the aquifer for municipal uses. One method of protecting regional water quality from brine discharged to the Santa Ana River is through the use of desalters. Desalters remove salt from the groundwater basins, and ultimately help the watershed achieve a salt balance.<sup>92</sup> Once desalters collect this brine, it is transported out of the area by the Santa Ana Regional Interceptor (SARI) Line.

The Orange County Sanitation District (OCSd) and Santa Ana Watershed Project Authority (SAWPA) operate the SARI Line. It has the capacity to carry 30 million gallons per day (mgd) of non-reclaimable wastewater from the upper Santa Ana River basin to the ocean. Before the wastewater is disposed into the ocean it goes through a treatment process. There are three forms of wastewater that the SARI Line carries including industrial, desalter concentrate, and occasionally domestic wastewater. There have been over 90 miles of SARI Line installed to date with the initial stage construction completed in 1975 and the most recent in 2002.<sup>93</sup>

The oldest portions of the SARI Line run below the Santa Ana River bed from Prado Dam to 7.4 miles (12 kilometers) downstream of Prado Dam. This section of the line is in jeopardy due to the anticipated increase in flows from the dam. Four alternatives are being considered, including; relocating the line to the north, relocating the line to the south, stabilizing the line in its current place, or no action. Initial cost estimates of the alternatives show that the stabilization of the SARI Line in its current location represents the least costly alternative.<sup>94</sup> Preliminary construction cost estimates for each alternative being considered are presented in Table 19.

**Table 19**  
**Preliminary Cost Estimates of SARI Line Alternatives**

Alternative	Cost	Economic Life
Stabilizing in place	\$33,300,000 <sup>a/</sup>	50 years
Relocating to the North	\$63,200,000	100 years
Relocating to the South	\$65,000,000	100 years

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<sup>91</sup> EIP Associates, 2002, *Santa Ana Integrated Watershed Plan Volume Two: Environmental and Wetlands Components*, prepared for the Santa Ana Watershed Project Authority, <http://www.sawpa.org/iwp/#Environment>.

<sup>92</sup> Southern California Salinity Coalition, *2002-2003 Strategic Action Plan*, <http://www.nwri-usa.org/uploads/Salinity%20Action%20Plan.pdf>.

<sup>93</sup> Santa Ana Watershed Project Authority, "SARI Systems Enhancement Project," [http://www.sawpa.org/sari/sari\\_enhancements.html](http://www.sawpa.org/sari/sari_enhancements.html).

<sup>94</sup> Personal communication with Hardat Khudal, Project Manager, Orange County Sanitation District, June 9, 2004.

a/ Cost estimate does not include construction of fish passage facilities.

Source: Personal communication with Ken Morris, Project Manager, USACE, Los Angeles District, August 11, 2004. Economic life data were obtained from the Service, August 26, 2004.

Some major costs of the project have yet to be determined and are associated with likely mitigation and conservation measures for the SAS. Currently an EIS/EIR is underway and an initial draft is scheduled for completion by November 2004, with a final draft expected in 2005.<sup>95</sup>

If the SARI line is left in its original location, it is anticipated that the line will need to be replaced in 50 years. However, if the line is constructed outside of the riverbed, the economic life will be 100 years. The difference in economic life of the alternatives is due to the inferior material used in the construction of the original portion of the SARI line.<sup>96</sup>

There are a host of environmental issues that are associated with the stabilization alternative. For example, the grade stabilizers that would be used with this process are very wide and would span the width of the river, creating a barrier to fish passage during normal flow at multiple points along the Santa Ana River.<sup>97</sup> Other concerns associated with the stabilization alternative include the limited ability to access the SARI Line if replacement of the line or section of the line is needed.

Accessing the SARI Line in the river may also prove to be difficult for routine maintenance and inspection. Routine maintenance is performed by accessing manholes located throughout the SARI Line. A few of these manhole covers are located on an island in the middle of the river. Due to the potential for the SAS to be harmed in the process of accessing the island, Orange County Sanitation District (OCSD), through the USACE, entered into consultation with the Service. The consultation process identified specific conservation measures for maintenance operations of the SARI Line in the Santa Ana River.

If the stabilization alternative is selected, it is likely that conservation measures for the project will include mitigation for permanently and temporarily disturbed habitat, as well as a requirement that USACE develop fish passage specific for the SAS through the grade stabilizers. In addition, concerns surrounding access to the line for routine maintenance would remain. However, if an alternative was chosen that moved the SARI Line out of the Santa Ana River this analysis assumes that no SAS mitigation or conservation measures would be required.

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<sup>95</sup> Personal communication with Hayley Lovan, Biologist, U.S. Army Corps of Engineers, June 16, 2004.

<sup>96</sup> Personal communication with Service Biologist, Carlsbad Fish and Wildlife Office, August 10, 2004.

<sup>97</sup> Personal communication with Service Biologist, Carlsbad Fish and Wildlife Office, August 10, 2004.

### 6.3.2.1 Cost Estimation Methodology for the SARI Line

At this point, it has not been determined which SARI Line alternative will be selected. As a result, the costs attributable to SAS conservation measures are difficult to estimate and will be presented as a range encompassing the SARI Line stabilization and relocation alternatives. Prospective capital costs of the SARI Line project alternatives were estimated primarily through interviews and correspondence with USACE, Los Angeles District, and OCSD. Retrospective and prospective costs associated with ongoing maintenance of the SARI Line include monitoring, surveying and designing temporary access to the manhole covers through the Santa Ana River. The anticipated conservation measures associated with stabilization of the SARI Line include installing fish passage through the grade stabilizers, mitigating for impacts to a perennial stream (Santa Ana River), protecting SAS through surveys before and after the construction phase, period of work restrictions, and monitoring.<sup>98</sup> These measures are discussed further below.

#### Temporary Access to Manhole Covers on Island

As a result of the section 7 consultation, OCSD hired a consulting biologist to monitor and transport SAS from the work area. The biologist was also in charge of planning the crossing of the river so that it would not harm or otherwise affect SAS. In order to cross the river, the biologist's design called for building up a shallow portion of the riverbed with sand and gravel. Additionally, nets were set up above the crossing to protect any fish that would be in the area during that time. A report containing results of surveying and monitoring efforts was provided to the Service. The OCSD did not have information on the costs of consulting services. In this analysis, the costs associated with the biologist consulting services were estimated at \$6,800.<sup>99</sup>

#### Other Conservation Measures

If the stabilization alternative is chosen, there will be several conservation measures resulting from consultation with the Service. Table 20 identifies these anticipated conservation measures and the corresponding estimated annual costs. The table is followed by text describing how these estimates were developed.

**Table 20**  
**Estimated Annual Cost of Conservation Measures**  
**for the Stabilization Alternative, SARI Line**

Conservation Measure	Estimated Annual Cost
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<sup>98</sup> Personal communication with Hayley Lovan, Biologist, U.S. Army Corps of Engineers, July 15, 2004.

<sup>99</sup> Assumes 80 hours of time at an average rate of \$85 per hour.

Surveying (Pre and Post Project)	\$10,000
Period of Work Restriction	N/A
Monitoring	\$113,000
Engineer and Implement Fish Barrier	\$160,000
<b>Total</b>	<b>\$283,000</b>

Surveying involves examining the physical condition and habitat of the SAS prior to commencement and following completion of the project. The surveying cost of \$10,000 is based on the estimated costs for surveying at water treatment facilities. It is assumed that \$10,000 includes the cost of surveying before and after the project. The period of work restriction implemented to avoid harm to the SAS during the spawning season is likely to extend the period of time necessary for completion of the SARI Line. However, no costs were assigned to this measure due to a lack of supporting information.

In assigning prospective costs for monitoring, it is assumed that a biologist will be required to be on site for half of every work day. The costs for a biologist are assumed to average \$85 per hour. The SARI Line project is expected to last one to two years (average 1.5) and will incur estimated monitoring costs of approximately \$113,000.<sup>100</sup> The prospective monitoring costs will only be incurred if the stabilization alternative is selected.

The final measure to be implemented is a fish passage through the grade stabilizers. This analysis assumes that a fish passage suitable for the SAS can be designed and will be implemented at each of the four stabilizers in the Santa Ana River. The cost of the four fish passage facilities is estimated at \$2 million each, totaling \$8 million.<sup>101</sup> The fish passage facilities are expected to have an economic life of 50 years, resulting in an annual cost of \$160,000.

The total cost of implementing conservation measures likely resulting from consultation with the Service on the stabilization of the SARI Line is estimated to total \$283,000 on an annual basis (see Table 20 above).

### Mitigation

If the stabilization alternative is chosen, it is likely that mitigation for perennial stream habitat that is temporarily or permanently affected will be required. In a past consultation concerning construction near Prado Dam, a measure to “create and or enhance one acre of perennial stream habitat within the Santa Ana River or its tributaries for each acre of unvegetated perennial stream that is temporarily or

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<sup>100</sup> Assumes 1,327.5 hours at \$85 per hour.

<sup>101</sup> Personal communication with Brent Mefford, Hydraulic Engineer, Water Resources Research Laboratory, U.S. Bureau of Reclamation, August 26, 2004.

permanently disturbed during construction-related activities” was required.<sup>102</sup> This analysis assumes that the same 1:1 ratio applies to the acreage of disturbed habitat associated with the SARI Line project. According to the footprint of the SARI Line, approximately four acres of habitat will be disturbed if the stabilization alternative is chosen.<sup>103</sup> The cost of wetland area restoration activities is estimated at approximately \$150,000 per acre, but can vary widely according to location and requirements.<sup>104</sup> Thus, the total cost of mitigation efforts related to the stabilization alternative of the SARI Line is estimated to be \$600,000, or \$12,000 on an annual basis over the life of the SARI Line.

### Range of Costs Associated with the SAS

The SARI Line must be moved or stabilized because it is in jeopardy due to the increased water holding capacity behind Prado Dam. Moving the SARI Line out of the riverbed is less costly than stabilizing it in place when comparing the annual costs. However, the present value of the relocation alternatives costs are significantly greater than the stabilization alternative. An EIS/EIR is currently underway to determine what pertinent issues are associated with each alternative and should be completed in the fall of 2004. At this point, it is not possible to determine which alternative will be the chosen. Therefore, this analysis assesses the range of costs associated with the different alternatives specific to the SAS. The relocation alternatives describe plans to install a new SARI Line outside of the riverbed and abandon the old line. Therefore, this analysis does not assess any cost to the SAS if either of the relocation alternatives are chosen. However, if the stabilization alternative is chosen, it is likely that the above mentioned conservation measures will result from consultation at an annual cost of \$283,000 along with an annual cost of mitigation of \$12,000 for a total annual cost of \$195,000.

#### 6.3.2.2 Retrospective Project Costs (1999-2004)

Retrospective project costs for the SARI Line include the changes in operation to the maintenance project. These consist of the costs for services performed by the consulting biologist and the project modifications attributable to the SAS during the maintenance activities on the SARI Line.

#### 6.3.2.3 Prospective Costs (2004-2024)

Prospective costs include the estimated range of \$0 to \$295,000 annually between relocating the SARI Line and stabilizing the SARI Line in its current location. This stream of annual costs over the analytical time frame of 20 years is then discounted back as a present value using three and seven percent rates.

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<sup>102</sup> U.S. Fish and Wildlife Service, December 5, 2001, “Biological Opinion for Prado Mainstem Project,” Ecological Services, FWS-SB-909.6.

<sup>103</sup> Personal communication with Hayley Lovan, Biologist, U.S. Army Corps of Engineers, June 19, 2004.

<sup>104</sup> Personal communication with Michael McCollum, McCollum Associates, June 14, 2004.

#### 6.3.2.4 Estimated Costs

Retrospective and prospective costs for the SARI Line are summarized in Table 21.

**Table 21**  
**Potential Economic Costs to the SARI Line**

Habitat Unit	Retrospective (Total)	Prospective (Total)		Prospective (Annual)
		3%	7%	
Unit 1A – Northern Prado Basin	\$0	\$0	\$0	\$0
Unit 1B – Santa Ana Wash	\$0	\$0	\$0	\$0
Unit 2 – San Gabriel River	\$0	\$0	\$0	\$0
Unit 3 – Big Tujunga Creek	\$0	\$0	\$0	\$0
<b>Total CHD</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
Excluded Lands (Essential Habitat)	\$7,000	\$0 - \$4,389,000	\$0 - \$3,125,000	\$0 - \$295,000

### 6.3.2.5 Assumptions and Uncertainties

**Table 22**  
**Assumptions and Uncertainties**

Assumption	Direction of Bias
The cost estimates attributable to the SAS are reflected in a range between costs associated with the anticipated conservation measures of the SARI Line relocation and stabilization alternatives. This may overstate or understate costs, as it is unclear at this point which alternative will be selected.	+/-
Construction cost estimates for relocating the SARI Line do not include any decommission costs associated with the current SARI Line. If decommissioning is required, it is likely that additional SAS conservation measures will be required during this process.	-
No costs are estimated for period of work restrictions.	-
Maintenance activities on the relocated SARI Line will not require additional SAS conservation measures.	-

+: This assumption is likely to produce an upward bias in cost estimates.

-: This assumption is likely to produce a downward bias in cost estimates.

+/-: No direction of bias can be determined.

### 6.3.3 WATER SUPPLY

Conservation activities for SAS may affect water supply facilities and agencies through conservation measures as well as reductions in the volume of water for used aquifer storage and recovery programs. The potential costs to water supply agencies are discussed below.

#### 6.3.3.1 Orange County Water District

Between 1999 and 2001, before the formation of the SAS Conservation Program, Orange County Water District (OCWD) contributed \$50,000 to fund research and monitoring of the SAS. This included funding for a report that was prepared for the National Fish and Wildlife Foundation.<sup>105</sup> OCWD is currently a member of the SAS Conservation Program and contributes annually in support of SAS research as well as implements conservation measures to protect the SAS.

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<sup>105</sup> Orange County Water District, December 2000, "Water Quality and Other Environmental Variables Associated with Variations in Population Densities of the Santa Ana Sucker."

The majority of the conservation measures are associated with the use of wetlands for water treatment. OCWD diverts water from the Santa Ana River to wetland ponds to filter out nitrates in the water prior to diversion to spreading basins. According to OCWD, concerns over the SAS could result in periodic shutdowns of the diversion. This would result in increased use of filters at the spreading basin and a reduction in the volume of water stored in the aquifer. The potential costs associated with a shutdown could be substantial.<sup>106</sup> However, in this analysis, economic costs were not assessed due to the difficulty associated with predicting occurrence of a shutdown event and the complexity of determining the incremental costs.

OCWD is also a proponent for a project that would implement changes in water conservation practices associated with the Prado Dam raise. Currently, water held behind Prado Dam is diverted to spreading basins for aquifer recharge. The Service issued a Biological Opinion (BO) for the Prado Dam Water Conservation and Supply Study in July 2002 to address the full effects of water conservation on the SAS.<sup>107</sup> The BO identified conservation measures required for the SAS as well as least Bell's vireo and the southwestern willow flycatcher. In accordance with the BO, the USACE and/or OCWD mitigated for 37.2 acres of riparian habitat determined to be affected by the project. The mitigation has been achieved through a contribution of \$25,000 per acre (or \$930,000) to the Santa Ana River Conservation Trust Fund. In addition, the USACE and/or OCWD were required to submit a habitat restoration plan for the 37.2 acre restoration site as well as develop an eradication plan for the removal of exotic and invasive species in the Prado Basin.

The 37.2 acres of restoration mentioned above involved effects to "riparian woodland" habitat and is not attributable to conservation measures for the SAS.<sup>108</sup> The eradication plan for the removal of exotic and invasive species in Prado Basin is specific to the SAS, however.<sup>109</sup> The eradication program is expected to cost OCWD \$20,000 to \$30,000 per year, in addition to labor costs associated with SAS conservation measures already incurred by OCWD (which are discussed below).<sup>110</sup> This analysis assigns a cost of \$25,000 to material and extra staffing on an annual basis for the fish eradication program sponsored by OCWD.

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<sup>106</sup> Personal communication with Dick Zembal, Environmental Program Manager, Orange County Water District, July 15, 2004.

<sup>107</sup> U.S. Fish and Wildlife Service, July 2002, "Biological Opinion for the Prado Dam Water Conservation and Supply Study, Orange, Riverside, and San Bernardino Counties, California," FWS-WRIV-2102.3.

<sup>108</sup> Personal communication with Dick Zembal, Environmental Program Manager, Orange County Water District, August 11, 2004.

<sup>109</sup> Personal communication with Service Biologist, Carlsbad Fish and Wildlife Office, August 11, 2004.

<sup>110</sup> Personal communication with Dick Zembal, Environmental Program Manager, Orange County Water District, August 11, 2004.

### 6.3.3.2 Los Angeles Department of Public Works

In the Big Tujunga Creek (Unit 3), water is diverted for water conservation from the Big Tujunga Dam. The water is used to recharge the San Fernando Aquifer, which is pumped for municipal drinking water by Los Angeles (90 percent), Burbank (5 percent), and Glendale (5 percent). Los Angeles County Department of Public Works (LADPW) is currently in informal consultation with the Service concerning operations at the dam. The anticipated result of the consultation is an increase of flow releases of approximately 1,500 acre-feet of water per year for the SAS. These releases will not carry enough flow with them to reach the spreading basins so they are considered “lost to conservation” and therefore represent an economic cost attributable to the SAS.<sup>111</sup>

A similar situation is present in the San Gabriel River (Unit 2). The Cogswell Dam, also operated by LADPW, holds water that is owned by the Main San Gabriel Basin Water Master, San Gabriel Valley Protective Association, and the San Gabriel River Committee of Nine. In May of 1989 a water management plan was drafted and signed by the above listed agencies, L.A. Department of Public Works, California Department of Fish and Game, and the Angeles National Forest. The plan details flow recommendations for suitable habitat of native fish species, primarily trout but also for the SAS.<sup>112</sup> These flow recommendations have been followed for over 15 years and are designed for a month by month flow recommendation. During dry months, the outflow recommendations are higher than the natural flows of the river.<sup>113</sup> No costs are attributed to the SAS listing and CHD in this analysis, however, as the management plan was developed a decade before the SAS was listed and was primarily developed to support trout.

### 6.3.3.3 Santa Ana River

Prado Dam is the only water conservation dam in the SAS CHD and EL in the Santa Ana Basin. Water releases from Prado Dam have not been identified as an issue of concern for the SAS, and it is not likely that future consultations will result in measures to increase flows from Prado.<sup>114</sup>

Forty miles upstream of Prado Dam is Seven Oaks Dam. Seven Oaks is not currently a water conservation facility, although the San Bernardino Valley Municipal Water District and Western Municipal Water District of Riverside County are proponents of a project to utilize Seven Oaks Dam to meet municipal water needs.<sup>115</sup> The Service provided preliminary comment to the project proponents in

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<sup>111</sup> Personal communication with Keith Lilley, L.A. Department of Public Works, June 14, 2004.

<sup>112</sup> Personal communication with Gary Hildebrandt, L.A. Department of Public Works, July 20, 2004.

<sup>113</sup> Personal communication with Pat Woods, L.A. Department of Public Works, July 19, 2004.

<sup>114</sup> Personal communication with Hayley Lovan, Biologist, U.S. Army Corps of Engineers, June 19, 2004.

<sup>115</sup> Personal communication with David Lovell, San Bernardino County Flood Control District, June 16, 2004.

September 2002 and expressed concern that the additional water removal would detrimentally affect the SAS.<sup>116</sup> At this point, it is unclear if the project will be approved and the implications that it will have for SAS habitat. Consequently, this analysis assumes that any future consultation completed on Seven Oaks Dam water conservation will not result in increased flows for the SAS or a reduction in Santa Ana River water availability to regional water providers that can be attributed to the SAS listing and CHD.

#### 6.3.3.4 Cost Methodology

Conservation measures outlined in the Conservation Program for the OCWD include installing fish screens, preventing the escape of non-native fish from wetland ponds, providing passages from the diversion channel to the main river channel, and designing and implementing a research program to assess SAS abundance in the Santa Ana River reach between Prado Dam and the drop structure downstream of Imperial Highway.<sup>117</sup> The research program and other surveying activities outlined in the Conservation Program are conducted by staff at OCWD. The amount of time spent on SAS conservation measures was estimated for each position and applied to the annual salary (including benefits) which resulted in the portion of salary attributable to the SAS listing and CHD. These cost estimates are provided in Table 23.

**Table 23**  
**Estimated OCWD Staffing Costs Attributable to SAS**

<b>OCWD Staff</b>	<b>SAS Staffing Costs</b>
Biologist	\$47,360
Surveyors	\$4,681
Environmental Program Manager	\$12,800
<b>Total</b>	<b>\$64,841</b>

Source: Personal communication with Dick Zembal, Environmental Program Manager for OCWD, July 15, 2004.

The estimated cost of installing fish screens is insignificant, and would likely account for less than a five percent incremental increase in time for operators of machinery working on the construction of the wetlands.<sup>118</sup> Fish screen installation costs were not assessed for this study. A fish transport passage from

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<sup>116</sup> U.S. Fish and Wildlife Service, September 12, 2002, "Notice of Preparation of a Draft Environmental Impact Report for the Santa Ana River Water Rights Application of San Bernardino Valley Municipal Water District and Western Municipal Water District of Riverside County, San Bernardino and Riverside Counties, California," FWS-SB/RIV-3119.1.

<sup>117</sup> Santa Ana Sucker Team, February 24, 2003, "Draft Conservation Program for the Santa Ana Sucker (*Catostomus santaanae*) within the Santa Ana River Watershed," Section G – Orange County Water District, pp. 24-25.

<sup>118</sup> Personal communication with Dick Zembal, Environmental Program Manager, Orange County Water District, July 15, 2004.

the wetland ponds back to the river is estimated to cost \$5,000.<sup>119</sup> This cost is considered a one-time expense in this analysis, and distributed over 20 years has an annual cost of \$250.

In the Big Tujunga Creek, Unit 2, an ongoing informal consultation between the Service and LADPW is anticipated to result in increased water releases from the Big Tujunga Dam. The estimate of these flows is 1,500 acre-feet per year, and will be ramped to support SAS habitat in Big Tujunga Creek. This water would have been diverted to a recharge area for the San Fernando Aquifer, where the L.A. Department of Water and Power pumps groundwater to supply the City of Los Angeles with municipal drinking water. The current annual average demand of the L.A. Department of Water and Power is 700,000 acre-feet. The Department has rights to 90,000 acre-feet of ground water, constituting 12.9 percent of their average demand.<sup>120</sup> The impact of this reduction will not be immediate, but the long-term effects are considered significant and estimated according to the following assumptions:

- Los Angeles Department of Water and Power must replace the water with imported water.
- The current (2004) price for imported water is \$418 per acre-foot. This rate changes every January and is held stable throughout the year.
- All 1,500 acre-feet would have been available for pumping from the aquifer (i.e., no conveyance or storage losses).
- The avoided cost of groundwater pumping is \$100 per acre-foot.<sup>121</sup>

Table 24 provides annual costs to the L.A. Department of Water and Power.

**Table 24**  
**Estimated Costs of Conservation Measures to L.A. Department of Water and Power**

<b>L.A. Dept. of Water and Power</b>	<b>Per Acre Foot</b>	<b>Annual (1,500 AF)</b>
Cost to Import Water	\$418	\$627,000
Cost Savings from Decreased Pumping	\$100	\$150,000
Net Costs per Acre-Foot	\$318	\$477,000

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<sup>119</sup> Personal communication with Dick Zembal, Environmental Program Manager, Orange County Water District, July 15, 2004.

<sup>120</sup> Personal communication with Mario Acevedo, L.A. Department of Water and Power, June 14, 2004

<sup>121</sup> Personal communication with Mario Acevedo, L.A. Department of Water and Power, June 14, 2004.

### 6.3.3.5 Retrospective Costs

The retrospective costs concerning water supply include OCWD's funding of research prior to the formation of the SAS Conservation Program and after the listing of the SAS (1999). Increased staffing requirements from 1999 to 2004 are also included in the retrospective cost estimate.

### 6.3.3.6 Prospective Costs

Staffing requirements are assumed to be maintained at the current level of \$64,841 annually. The annual net cost of importing water that will be lost as a result of ramping flows for the SAS is estimated to be \$477,000 and is included in the prospective cost estimate. The one time cost of \$5,000 for a fish passage is also included in the prospective costs for water supply.

### 6.3.3.7 Estimated Costs

Table 25 summarizes the retrospective and prospective costs to water supply.

**Table 25**  
**Potential Economic Costs to Water Supply**

<b>Habitat Unit</b>	<b>Retrospective (Total)</b>	<b>Prospective (Total)</b>		<b>Prospective (Annual)</b>
		<b>3%</b>	<b>7%</b>	
Unit 1A – Northern Prado Basin	\$0	\$0	\$0	\$0
Unit 1B – Santa Ana Wash	\$0	\$0	\$0	\$0
Unit 2 – San Gabriel River	\$0	\$0	\$0	\$0
Unit 3 – Big Tujunga Creek	\$0	\$7,097,000	\$5,053,000	\$477,000
<b>Total CHD</b>	<b>\$0</b>	<b>\$7,097,000</b>	<b>\$5,053,000</b>	<b>\$477,000</b>
Excluded Lands (Essential Habitat)	\$309,000	\$1,337,000	\$952,000	\$90,000

### 6.3.3.8 Assumptions and Uncertainties

**Table 26**  
**Assumptions and Uncertainties**

<b>Assumption</b>	<b>Direction of Bias</b>
Flow releases from Big Tujunga Dam are assumed to be 1,500 acre-feet per year	+
No conveyance and recovery losses are considered	+
The market price of imported water will not change over the next 20 years	+/-
Future consultations with Seven Oaks and Prado Dams will not result in additional flow requirements for the SAS	-

+: This assumption is likely to produce an upward bias in cost estimates.

-: This assumption is likely to produce a downward bias in cost estimates.

+/-: No direction of bias can be determined.

### 6.3.4 FLOOD CONTROL OPERATIONS

There are three flood control districts involved with the SAS Conservation Program. These three districts are: Riverside County Flood Control and Water Conservation District, Orange County Flood Control District, and San Bernardino County Flood Control District.

All three entities participate in the SAS Conservation Program to cover activities involving maintenance of flood control structures, flood capacity and low flow channels within the Santa Ana River. These flood control activities are performed to ensure the structural integrity of levees that protect industrial, commercial, and residential properties from flood damage. The existing Santa Ana River Levee System was constructed by the USACE during the 1950s in response to the devastating floods of 1938. The flood control agencies act as local sponsors and are charged with operation and maintenance of the flood control structures as specified in the Maintenance Manual prepared in 1960 by the USACE. The Maintenance Manual requires that “the floodway shall be maintained clear of debris, weeds, and wild growth,” and that it not be “restricted by the depositing of waste materials, building of unauthorized structures or other encroachments.”<sup>122</sup> In order to accomplish these mandates, the flood control agencies manage the vegetation within the Santa Ana River by mowing and applying approved herbicides to impede the growth of invasive plant species that dominate the area.

Flood control operations are also critical in the San Gabriel River. Sediment removal operations in San Gabriel Reservoir are performed by L.A. County Department of Public Works (LADPW). LADPW entered into consultation with the Service for an emergency sediment removal project following the fires

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<sup>122</sup> Personal communication with Teresa Tung, Riverside County Flood Control, June 29, 2004.

of 2002, which resulted in large amounts of sediment in the reservoir requiring immediate action to remove it. Sluicing, a hydraulic method of sediment removal, is not allowed under the existing sediment removal plan for the reservoir. Consequently, LADPW must physically enter the reservoir to remove sediment. A consultation with the Service could not be completed due to an injunction prohibiting the Service from issuing Biological Opinions and concurrence letters. However, the Service was notified by USFS that this action would be happening and protective measures specific to the SAS were included in the proposed project description for emergency notification.<sup>123</sup>

In order to avoid harm to the SAS during sediment removal operations in the San Gabriel Reservoir, appropriate measures were requested by the Service in a letter dated September 26, 2003. These measures called for a qualified biologist oversee the capture and relocation of SAS in the work areas. Seine nets are set upstream of the work area, and electro-shocking is done to stun fish before moving them upstream of the barrier. These measures are required each day during the sediment removal project. The relocation site must be approved by the Service, and the biologist should report the results of the site surveying and monitoring to the Service. The sediment removal and implementation of conservation measures are ongoing and expected to last another five years.<sup>124</sup>

#### 6.3.4.1 Cost Methodology

Riverside County Flood Control and Water Conservation District (RCFC) agreed to have a qualified biologist oversee activities that involve diverting or de-watering portions of the river. The standard procedure to protect the SAS in the area of maintenance involves blocking off the river where the project is taking place so the SAS is isolated, hauling them to another area of the river, monitoring them in that portion of the river, and finally reporting the results to the Service. In addition to monitoring and reporting, the biologist also designed the realignment of the low flow channel away from the existing USACE levee. Biologists were present during the entire operation of RCFC's project and will prepare a report for the Service summarizing the activities and monitoring that took place on site. Monthly monitoring and reporting will last for a period of 15 months. The total cost for the consulting services related to RCFC's flood control activities over 15 month project period is estimated at \$88,738, or \$70,990 on an annual basis.<sup>125</sup> In this study, it is assumed that these costs will continue throughout the prospective analysis period.

Orange County Flood Control District (OCFCD) is required to conduct surveys for the SAS on a weekly basis from March 15 through June 30 when river crossing is required to accomplish the work. The expected cost of hiring a biologist that is qualified by the Service is \$7,500 per survey and it is anticipated

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<sup>123</sup> Personal communication with Service Biologist, Carlsbad Fish and Wildlife Office, August 26, 2004.

<sup>124</sup> Personal communication with Patricia Wood, Senior Civil Engineer, L.A. County Department of Public Works, Water Resources Division, July 19, 2004.

<sup>125</sup> Personal communication with Teresa Tung, Riverside County Flood Control, June 29, 2004.

that surveys will be required each week of the spawning season.<sup>126</sup> In total, 14 weekly surveys are expected to occur each year, from March through June.<sup>127</sup> Thus, the annual cost of surveying to OCFD is \$105,000.

Specific cost estimates concerning impacts of SAS conservation measures were not made available by San Bernardino County Flood Control District (SBCFCD). As a participant in the SAS Conservation Program, SBCFCD is required to remove and relocate SAS prior to sediment removal operations. In order to estimate the cost of implementing this measure, the average cost of the two agencies described above (RCFC and OCFD) was applied. In this analysis, an annual cost of \$87,995 was assigned to SBCFCD for monitoring, surveying, and relocating SAS.

In the San Gabriel Reservoir, LADPW has spent approximately \$250,000 on monitoring, relocating, and surveying for the SAS during the past year. It is assumed in this analysis that this will be incurred for each of the next five years, or for the life of the emergency sediment removal project. After that time frame, routine sediment removal as well as the corresponding monitoring, relocation and surveying of the SAS will likely occur every other year.<sup>128</sup>

#### 6.3.4.2 Retrospective Costs

Retrospective costs are assigned to each flood control activity as described above and include all costs identified to protect the SAS since listing. Costs for SBCFCD were estimated using average annual costs described from other flood control agencies.

#### 6.3.4.3 Prospective Costs

Prospective costs for LADPW include the monitoring, surveying, and relocation cost of \$250,000 per year over the next five years, and the same cost every other year until the end of this analysis (20 years). The net present value of these future cash outflows is \$2.23 million and \$1.59 million after discounting with three percent and seven percent discount rates, respectively. These costs are included in the Unit 2, San Gabriel River.

Prospective costs were also assigned to lands that were excluded from the CHD but that are considered essential for the SAS. The lands were excluded from the CHD because they are covered by the SAS Conservation Program. The total annual costs for the three agencies involved in the program are estimated

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<sup>126</sup> Personal Communication with Lisa Cibellis, Orange County Flood Control District, County of Orange Public Facilities and Resources Department, July 20, 2004.

<sup>127</sup> Personal Communication with Lisa Cibellis, Orange County Flood Control District, County of Orange Public Facilities and Resources Department, July 20, 2004.

<sup>128</sup> Personal communication with Patricia Wood, Senior Civil Engineer, L.A. County Department of Public Works, Water Resources Division, July 19, 2004.

at \$184,121. The present value of these flows extending out 20 years using three percent and seven percent discount rates is \$2.7 million and \$2.0 million, respectively.

#### 6.3.4.4 Estimated Costs

Table 27 provides a summary of the estimated costs to flood control operations.

**Table 27**  
**Potential Economic Costs to Flood Control Operations**

Habitat Unit	Retrospective (Total)	Prospective (Total)		Prospective (Annual)
		3%	7%	
Unit 1A – Northern Prado Basin	\$0	\$0	\$0	\$0
Unit 1B – Santa Ana Wash	\$0	\$0	\$0	\$0
Unit 2 – San Gabriel River	\$250,000	\$2,232,000	\$1,589,000	\$150,000*
Unit 3 – Big Tujunga Creek	\$0	\$0	\$0	\$0
<b>Total CHD</b>	<b>\$250,000</b>	<b>\$2,232,000</b>	<b>\$1,589,000</b>	<b>\$150,000</b>
Excluded Lands (Essential Habitat)	\$89,000	\$2,739,000	\$1,951,000	\$184,000

\* \$250,000 annual cost each year for five years, and every other year thereafter until 2024.

#### 6.3.4.5 Assumptions and Uncertainties

**Table 28**  
**Assumptions and Uncertainties**

Assumption	Direction of Bias
RCFC will be required to implement monitoring, surveying, and relocation efforts on an annual basis	+
OCFD will be required to implement surveying efforts 14 weeks per year over the course of 20 years. This has been discussed as a minimization measure, but has not been finalized.	+
San Bernardino Flood Control District will be required to implement annual surveying, monitoring, and relocation efforts as part of participation in the SAS Conservation Program. This may overstate costs as much of SBFCD's work occurs during the dry season in dry reaches of the stream where surveying, monitoring, and relocation efforts would not be required.	+
Surveying and monitoring costs will not change during the prospective period	+/-

+: This assumption is likely to produce an upward bias in cost estimates.

-: This assumption is likely to produce a downward bias in cost estimates.

+/-: No direction of bias can be determined.

## 6.4 EFFECTS ON RECREATION

### 6.4.1 INTRODUCTION

This section assesses the potential impacts of the SAS conservation measures on recreational activities. Based upon a review of the consultation history, public comment letters, and interviews with recreation managers, three activities were selected for analysis. These include Recreational Mining (Section 6.4.3), Off Highway Vehicle (OHV) Use (Section 6.4.4), and Other Water-Related Activities (Section 6.4.5).

The majority of recreational use within SAS habitat occurs on two national forests, the Angeles National Forest (ANF) and San Bernardino National Forest (SBNF). Recreational use along streams and rivers with critical habitat areas can negatively affect the SAS. Suction dredging methods are commonly used for recreational mining and have the potential to negatively affect the SAS by damaging eggs and larvae, particularly if dredging occurs in spawning areas.<sup>129</sup> OHV use can negatively impact SAS habitat in areas where trails cross streams by increasing sedimentation from streambank erosion and alteration of a stream's channel morphology through physical disturbance.<sup>130</sup> Water-related activities have the potential to affect SAS habitat in several ways. For example, recreationists create dams and holes in rivers for swimming and wading, which can impede fish passage. In addition, disposal of charcoal for cooking activities in rivers has been identified as a detrimental activity to the SAS.

Geographic areas potentially affected by SAS conservation measures include:

Unit 1A - Northern Prado Basin and Unit 1B - Santa Ana Wash. There are 623 acres of SAS critical habitat (Unit 1B – Santa Ana Wash) in SBNF. Unit 1B (Santa Ana Wash) also contains 2,059 acres managed by the Department of Defense (DOD) and 903 acres managed by the Bureau of Land Management (BLM). Aside from USFS lands, there appear to be no other public recreation lands directly included in Unit 1A (Northern Prado Basin) or Unit 1B (Santa Ana Wash).

The SBNF is situated in the San Gabriel, San Bernardino, San Jacinto, and Santa Rosa mountains about 60 miles east of Los Angeles, California. The SBNF contains a total of 888,999 acres and received 1,953,634 national forest visits in 2003.<sup>131</sup> A national forest visit is the entry of one person to a national forest to participate in recreation activities for an unspecified period of time and can be composed of multiple site visits. There are nine picnic areas, 25 trailheads, and 46 campgrounds with the capacity to

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<sup>129</sup> U.S. Fish and Wildlife Service, April 12, 2000, "Threatened Status for the Santa Ana Sucker, Final Rule," *Federal Register*, Vol. 65, No. 71, p. 19690.

<sup>130</sup> *Ibid.*, p. 19691.

<sup>131</sup> U.S. Forest Service, June 2004, "National Visitor Use Monitoring Results – San Bernardino National Forest," [http://www.fs.fed.us/recreation/programs/nvum/reports/year4/R5\\_F12\\_sanbernadino\\_final.htm](http://www.fs.fed.us/recreation/programs/nvum/reports/year4/R5_F12_sanbernadino_final.htm), accessed June 25, 2004.

accommodate approximately 4,350 campers in the SBNF.<sup>132</sup> The heavy recreational use has result in 83 concentrated use areas (CUA) within the forest. A CUA is an undeveloped area where maintenance and management time and money are invested because recreation use leaves evident impacts, including litter, vandalism, or soil compaction. Activities at such sites include hunting, fishing, wildlife watching, scenery viewing, picnicking, camping, snow play, and water play. Facilities in these areas are limited to portable toilets, minimal parking, trashcans, signs and kiosks. These facilities often require cleaning, pumping, graffiti removal, and repair of vandalism. Graffiti and trash removal are required along heavily used roads as well as in CUAs while high use near rivers and streams can require watershed restoration activities.<sup>133</sup>

The SBNF is a rich and diverse biological resource of trees, rivers, streams, fish, birds, reptiles, mammals, and other natural resources. The SBNF is home to 440 wildlife species and thousands of plant species. Over 30 of these species of animals and plants are listed as threatened or endangered. Within and around the forest are five Federally designated wilderness areas, ranging in size from 12,000 acres to almost 95,000 acres. Hunting, recreational shooting, fishing, hiking, backpacking, mountain biking, horseback riding, boating, and off-highway vehicle adventures are available in the warmer months. In the winter, several areas scattered throughout the forest offer alpine and cross-country skiing opportunities as well as snow play.<sup>134</sup>

Unit 2 – San Gabriel River. There are 5,314 acres of SAS habitat in the ANF. Aside from USFS lands, there appear to be no other public recreation lands directly adjacent to Unit 2.

Unit 3 – Big Tujunga Creek. There are 1,169 acres of SAS habitat in the ANF. Aside from USFS lands, there appear to be no other public recreation lands directly adjacent to Unit 3.

The ANF contains more than 650,000 acres and is used intensively for recreation by the greater metropolitan area of Los Angeles. The ANF manages the watersheds within its boundaries to provide water to southern California. The land within the ANF is diverse in appearance and terrain and provides a wide range of recreational activities. Elevations range from 1,200 to 10,064 feet. Much of the forest is covered with dense chaparral, which changes to pine and fir-covered slopes at higher elevations. Recreation use in the ANF for calendar year 2000 was 3,471,486 national forest visits.<sup>135</sup>

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<sup>132</sup> U.S. Forest Service, 2004, "Southern California Land Management Plan Revisions: San Bernardino National Forest," <http://scfpr.esri.com/scfpr/builds/build947/index5.htm>, accessed June 23, 2004.

<sup>133</sup> Ibid.

<sup>134</sup> U.S. Forest Service, "San Bernardino National Forest," <http://www.fs.fed.us/r5/sanbernardino/index.html>, accessed June 22, 2004.

<sup>135</sup> U.S. Forest Service, August 2001, "National Visitor Use Monitoring Results – Angeles National Forest," [http://www.fs.fed.us/recreation/programs/nvum/reports/year1/R5\\_Angelos\\_final.htm](http://www.fs.fed.us/recreation/programs/nvum/reports/year1/R5_Angelos_final.htm), accessed June 22, 2004.

## 6.4.2 METHODOLOGY

### 6.4.2.1 Overview

Recreational use data were collected and phone interviews were conducted in order to characterize the potential effects of the SAS conservation measures on recreational visitors and the recreation economy. Data collection consisted of two key tasks: 1) a literature review of recreation-related studies pertinent to assessing SAS listing effects, and 2) personal interviews to solicit respondents' perceptions of how the SAS listing and CHD has affected or may affect recreation-related use or area visitation. During these interviews, quantitative data were obtained whenever possible.

## 6.4.3 RECREATIONAL MINING

### 6.4.3.1 Existing Conditions

#### Unit 1A - Northern Prado Basin

There are no national forest lands within Unit 1A.

#### Unit 1B - Santa Ana Wash

Unit 1B, Santa Ana Wash, contains some land within the SBNF. However, there is no known recreational mining use in this unit.<sup>136</sup>

#### Unit 2 - San Gabriel River

In the past, the California Department of Fish and Game (CDFG) has issued suction dredge mining permits for the East Fork of the San Gabriel River, and there may be recreational mining occurring there.<sup>137</sup> However, it is unknown how many individuals pursue recreational mining in this area. The suction dredge mining permits issued by CDFG are not specific to particular geographic areas.

### 6.4.3.2 Estimated Costs

Some recreational mining occurs within Unit 2, San Gabriel River. No other SAS habitat units were found to be affected by recreational mining. The future permitting of recreational mining activities in the East Fork of the San Gabriel River are unknown. In addition, the current number of participants in the

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<sup>136</sup> Personal communication with Bob Wood, San Bernardino National Forest, June 2004.

<sup>137</sup> Personal communication with Dwayne Maxwell, California Department of Fish and Game, June 28, 2004.

activity can not be quantified with available information. Consequently, no costs are estimated for recreational mining in this analysis.

#### 6.4.4 OHV USE

##### 6.4.4.1 Existing Conditions

##### Angeles National Forest OHV Opportunities

The ANF provides 364 miles of designated OHV routes (roads). Because of the many different uses of the forest and the delicate environment, all OHV travel must be on designated routes and trails or in designated Open Areas. Occasionally, areas may be closed due to emergencies, resource protection, or during specific seasons when disturbances may drive animals from important habitat. These closures are usually temporary. Stream banks and lakeshores are especially sensitive areas and are easily susceptible to damage. In recognition of this, OHV users are asked to cross streams at a 90 degree angle at a slow speed and to not travel up and down stream channels. Cutting switchbacks, taking shortcuts or hillside climbing is also discouraged and can result in long-lasting damage.<sup>138</sup>

The predominant recreation activity that occurs in SAS critical habitat is OHV use. The total area for OHV use varies between one mile in the wet season to two miles in the dry season (approximately 800 acres), with all of it occurring in the West Fork of the San Gabriel River. Attendance data at San Gabriel OHV Park indicate there has not been a reduction in OHV users as a result of management measures in place to protect SAS.<sup>139</sup> Little OHV use occurs in the Los Angeles River District of the ANF, as the terrain is too steep and sensitive to erosion.<sup>140</sup>

In response to the SAS listing and CHD, the USFS has installed information signs in the OHV area. In the OHV staging area, there are some educational brochures available with general information on acceptable and unacceptable behaviors. There is also a kiosk with informational signs relating to the SAS.<sup>141</sup> In addition, the USFS recently completed a Biological Assessment (BA) on the impacts of continued OHV use. The BA was not available for use in this study. The USFS is expecting to initiate formal consultation with USFWS in the near future.

Table 29 provides estimated OHV usage in Unit 2 (San Gabriel River) within the ANF for 1998 through 2002. These numbers were developed using OHV user fee information and head counts by USFS staff working the OHV area.

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<sup>138</sup> Personal communication with Bill Brown, Biologist, Angeles National Forest, June 21, 2004.

<sup>139</sup> Personal communication with Bill Brown, Biologist, Angeles National Forest, June 21, 2004.

<sup>140</sup> Personal communication with Howard Okamoto, Angeles National Forest, May 8, 2004.

<sup>141</sup> Personal communication with Bill Brown, Biologist, Angeles National Forest, June 21, 2004.

**Table 29**  
**OHV Visitation in the Angeles National Forest, 1998-2003**

<b>Year</b>	<b>Visitation</b>
1998	38,000
1999	78,000
2000	54,000
2001	68,000
2002	174,500
2003	175,000 (estimated)

Source: Personal communication with Bill Brown, Biologist, Angeles National Forest, June 21, 2004.

Although some SAS conservation measures have been instituted by the USFS, OHV use in the area has increased since the SAS conservation measures were implemented. According to the USFS, the increase in visitation can be attributed to several factors. First, during the timeframe 2001-2002 there was less water available in the San Gabriel River and therefore more land available along the river to ride OHVs and drive four-wheel drive vehicles (4WD). Second, OHV vehicles sales in the years 2001-2002 increased statewide by approximately 300 percent, thus more people participated in OHV activity in the San Gabriel River area. Third, there was a statewide increase in sales and use of 4WD vehicles as well. These three factors, according to the USFS, contributed to the increase in OHV and 4WD use in the San Gabriel River area starting in 2002.<sup>142</sup>

In the past three years, the USFS has coordinated with the Service and CDFG to develop “avoidance criteria” for OHV users at San Gabriel OHV Park. This has included the elimination of two stream crossings and the placement of rock and boulders along the riverbank to prevent people from driving into the river. Within the last three years, a great deal of time has gone towards protecting the SAS through increased patrols in sensitive areas, especially during weekends. The USFS also has worked with the local OHV club to develop SAS education programs. In addition to the USFS efforts, the OHV club is self-policing its members.<sup>143</sup> The OHV club has placed at least one vehicle and drivers per weekend at the San Gabriel OHV Area for the past several years.<sup>144</sup> Direct costs for the OHV club efforts in self-policing are difficult to estimate. Assuming a volunteer vehicle was on site for all the weekends in 2001, 2002, and 2003, fuel costs per year may be as much as \$12,480 (104 weekend days per year x \$40 fuel per day x three years = \$12,480). This does not count indirect costs associated with self-policing such as volunteer time and other vehicle-related costs such as insurance, wear and tear, vehicle depreciation, etc.

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<sup>142</sup> Personal communication with Bill Brown, Biologist, Angeles National Forest, July 2004.

<sup>143</sup> Personal communication with Bill Brown, Biologist, Angeles National Forest, June 21, 2004.

<sup>144</sup> Personal communication with Bill Brown, Biologist, Angeles National Forest, June 21, 2004.

## San Bernardino National Forest OHV Opportunities

There are over 900 miles of road open to four-wheel drive (4WD) vehicle travel (104 miles of which are 4WD routes). The OHV system offers a wide range of trails for all experience levels. The forest offers 36 miles of 24-50" trails with an additional 169 miles of forest roads available for OHV use.<sup>145</sup> Cactus Flats Staging area near Big Bear, Pinnacles Staging area near Lake Arrowhead, eight trailer sites, Big Pine Flats Campground, Horse Spring Campground, and Crab Flats Campground offer direct access to the OHV system to enhance riding and driving opportunities in the forest.<sup>146</sup> The City Creek and Mill Creek areas within the SBNF have no identified OHV activity.

### 6.4.4.2 Cost Estimation Method

Recreational OHV use and opportunities in critical and essential SAS habitat have not declined due to listing and CHD. In some areas of the ANF, such as the San Gabriel OHV Park, where critical habitat has been designated for the SAS, annual OHV use has actually increased. However, the USFS and private OHV groups have incurred costs as a result of SAS protection efforts. Table 30 provides estimates of these costs.

**Table 30**  
**Estimated Costs of Conservation Measures at the San Gabriel OHV Park**

<b>Habitat Unit (USFS Area) and Conservation Measure</b>	<b>Estimated Cost</b>	<b>Year(s)</b>
<i>Unit 2 San Gabriel River</i>		
Rock placement	\$12,000	2001
Rock maintenance	\$6,000	2002
Rock maintenance	\$6,000	2003
OHV operations Biological Assessment	\$45,000	2002-2003
San Gabriel OHV area operations*	\$286,200	1999-2003
San Gabriel OHV area signs	\$10,000	2003
San Gabriel Canyon OHV volunteer efforts	\$12,480	2001-2003

\* Not all costs are attributable to the SAS. According to USFS personnel, approximately 10 percent of total amount can be attributed to non-SAS protection efforts.

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<sup>145</sup> U.S. Forest Service, June 2, 2003 (last updated), "San Bernardino National Forest, Off Highway Use," <http://www.fs.fed.us/r5/sanbernardino/recreationactivities/offhighway/>, accessed June 22, 2004.

<sup>146</sup> Ibid.

#### 6.4.4.3 Retrospective Costs

Retrospective costs were developed according to the information provided in Table 30. Costs include initial rock placement, rock maintenance, biological assessment development, operations, sign placement, and volunteer efforts.

#### 6.4.4.4 Prospective Costs

Prospective costs were estimated by assuming that the costs provided in Table 30 will continue for each year of the analysis. All costs except initial rock placement and development of the biological assessment were included. The costs were annualized by dividing the cost estimate by the number of years included. The total annual cost was then discounted over a 20 year period using a three and seven percent discount rate. It is assumed that there are no impacts on the rate of visitation due to SAS listing and CHD.

#### 6.4.4.5 Estimated Costs

Table 31 provides a summary of the estimated economic costs to OHV facilities. Costs are for Unit 2, San Gabriel River, which contains an OHV Park. Total retrospective costs are \$378,000 and total prospective costs are approximately \$1.3 million and \$1.0 million using a three percent and seven percent discount rate, respectively. Annual costs are projected to be \$90,000 over the next 20 years.

**Table 31**  
**Potential Economic Costs to OHV Facilities**

Habitat Unit	Retrospective (Total)	Prospective (Total)		Prospective (Annual)
		3%	7%	
Unit 1A – Northern Prado Basin	\$0	\$0	\$0	\$0
Unit 1B – Santa Ana Wash	\$0	\$0	\$0	\$0
Unit 2 – San Gabriel River	\$378,000	\$1,336,000	\$951,000	\$90,000
Unit 3 – Big Tujunga Creek	\$0	\$0	\$0	\$0
<b>Total CHD</b>	<b>\$378,000</b>	<b>\$1,336,000</b>	<b>\$951,000</b>	<b>\$90,000</b>
Excluded Lands (Essential Habitat)	\$0	\$0	\$0	\$0

#### 6.4.5 OTHER WATER-RELATED ACTIVITIES

Based upon information reviewed for this analysis, no special fishing regulations have been instituted by CDFG due to the SAS conservation measures. Consequently, no economic impacts to recreational fishing

are estimated. USFS has implemented measures to protect the SAS that affects other water-related recreation, however. These are discussed below.

#### 6.4.5.1 Potential Effects to Water-Related Recreation

##### Angeles National Forest

###### *Unit 2 - San Gabriel River*

The SAS is present in both the North and East Fork of the San Gabriel River. Recreation use levels in the San Gabriel River area of the ANF have not been affected by SAS protection measures.<sup>147</sup> Based on the presence of the SAS, the USFS has implemented various restrictions aimed at protecting SAS. These include:

- Visitors are asked to not construct dams in the North and East Fork of the San Gabriel River or to dig holes in the river for swimming;
- In the East Fork San Gabriel River, visitors are prohibited from using charcoal for barbecues near the river. Only gas cooking stoves are permitted as charcoal coals are sometimes thrown into the river in an attempt to prevent forest fires.

Visitors are supportive of the restrictions.<sup>148</sup> Information about the SAS protection measures and the presence of the SAS are distributed via USFS staff and volunteers at the visitor center and through patrolling the area. Costs associated with this activity could not be estimated.

###### *Unit 3 – Big Tujunga Creek*

The USFS has not instituted any formal conservation measures in the area due to the SAS.<sup>149</sup> This is because the SAS occupied area is upstream in Big Tujunga Creek and there are no known SAS in the Los Angeles River District area of the ANF. Additionally, the Los Angeles County Municipal Water District is in the process of determining whether to retrofit the Big Tujunga Canyon Dam located upstream. The USFS is waiting for a decision on the dam's retrofit before instituting any management criteria on the SAS because the retrofit would affect the water supply downstream and impact both recreation and the SAS.

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<sup>147</sup> Personal communication with Lois Pickens, Angeles National Forest, June 22, 2004.

<sup>148</sup> Ibid.

<sup>149</sup> Personal communication with Howard Okamoto, Angeles National Forest, June 2004.

Swimming in the area is limited to pockets of ponds scattered throughout the area, but visitors do not use many of them because they are located too far from roads and most people are unwilling to hike to them.<sup>150</sup> Big Tujunga Creek has not been affected by the SAS listing, but recreation has been affected by the drought situation in the area over the past four to five years.<sup>151</sup> The lack of water in the area has reduced the number of visitors dramatically.<sup>152</sup> Prior to the drought, several thousand visitors would use the area on an average weekend. Presently, only a couple of hundred people visit the area on an average weekend. When water levels improve in the area, visitation would also likely increase.<sup>153</sup>

The USFS is working with the City of Los Angeles and Los Angeles County of Public Works to establish minimum flows for SAS on a drainage area owned by the City in the Big Tujunga Canyon.<sup>154</sup> USFS personnel indicated that future management may require recreation restrictions such as establishment of capacity limits in the area.<sup>155</sup> These changes could affect recreational use, but these impacts will not be clear until the management strategy is complete.

### San Bernardino National Forest

There is no recreation use on City Creek, but there is recreation use on Mill Creek.<sup>156</sup> Mill Creek is dry about half of any given year. In the area where there is SAS critical habitat, there are several recreation sites including Thurman Flats, the Falls Recreation Complex, and a number of CUAs. There is a high level of water-related use in this area and there have been no regulations or restrictions imposed by the USFS regarding recreation use in the Mill Creek area.<sup>157</sup> Overall, use for the Mill Creek area has decreased eight percent (19,942 to 17,805 visits) from 2001 to 2003. It is unlikely that the decreases in use are related to habitat protection and the SAS. USFS staff indicate there have not been any management changes made in terms of restricting recreation use, or prohibiting construction of dams to create swimming holes.<sup>158</sup>

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<sup>150</sup> Ibid.

<sup>151</sup> Ibid.

<sup>152</sup> Ibid.

<sup>153</sup> Ibid.

<sup>154</sup> Personal communication with Bill Brown, Biologist, Angeles National Forest, June 21, 2004.

<sup>155</sup> Ibid.

<sup>156</sup> Personal communication with Bob Wood, San Bernardino National Forest, May 21, 2004

<sup>157</sup> Ibid.

<sup>158</sup> Ibid.

#### 6.4.6 SUMMARY OF RECREATION-RELATED EFFECTS

Conversations with USFS recreation staff and biologists and review of available information indicate that there have not been any significant decreases in recreation use attributable to the SAS protection measures. In addition, future changes in recreation management, while uncertain at this time, are unlikely to measurably impact recreation opportunities in the region. For recreational mining, there are not any known areas within SAS habitat on national forest lands where recreational mining occurs except for the East Fork of the San Gabriel River. Future permitting of recreational mining in the East Fork is currently unknown. There have been restrictions placed on OHV use in the San Gabriel OHV area, however use has not decreased. Additional rules have also been imposed on visitors that recreate on the North and East forks of the San Gabriel River. The effects of these rules on recreational opportunities and visitation levels are considered to be minor. Swimming and water play activities in the Big Tujunga area have decreased in the last several years. However, these changes are presumably related to changes in instream flow.<sup>159</sup> Specifically, in recent years flows have been too low to provide pools for swimming and water play. Future changes involving recreation carrying capacity limits may occur along Big Tujunga Creek and the San Gabriel River, pending the outcome of consultation with the Service.

#### 6.5 EFFECTS ON ROAD MAINTENANCE AND TRANSPORTATION

This analysis examines the costs of conservation measures associated with past and future transportation projects in SAS habitat. Projects requiring conservation measures may include the widening of a road, the reconstruction of a bridge, or maintenance of existing infrastructure. Past consultation history reveals that the Service has consulted on four transportation-related projects since the SAS was proposed for listing in 1999, all of which involved bridge reconstruction and maintenance. This cost analysis focuses on bridge projects as no other project types are represented by the SAS consultation history. In addition, the majority of USACE permits issued within SAS habitat have involved bridge projects.

Transportation projects can produce environmental impacts that may affect SAS habitat directly (i.e., riparian destruction during a bridge replacement) or indirectly (i.e., increased erosion from a road widening project). In this analysis, costs associated with SAS conservation measures are based upon the costs of specific construction project modifications designed to reduce habitat impacts. These have included sediment control, spill prevention, monitoring, SAS relocation, and other such modifications.

The costs assessed in this analysis are based upon information provided by the Riverside County Transportation Department (RCTD) and California Transportation Department (Caltrans) for past transportation projects requiring SAS consultation with the Service. Past costs are assigned only to projects that were consulted on. Future costs are estimated using past USACE permit information.

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<sup>159</sup> Personal communication with Howard Okamoto, Angeles National Forest, May 8, 2004.

### 6.5.1 COST ESTIMATION METHODOLOGY

RCTD and Caltrans provided cost estimates for past projects that have required conservation measures for the SAS. These estimates are summarized in Table 32 below. All three of the projects involved bridge repair or construction of varying sizes and project duration.

**Table 32**  
**Estimated Cost of Conservation Measures for Transportation Projects**

Conservation Measure	Project 1	Project 2	Project 3
Flow Diversion, Silt Fence, and Cleanup	\$8,763	\$180,000	\$3,000,000
Sediment Control	\$0	\$10,000	
Stream Crossing	\$2,600	\$0	
Surveying, Monitoring, and Reporting	\$10,345	\$74,000	
<b>Total Costs</b>	<b>\$21,708</b>	<b>\$264,000</b>	<b>\$3,000,000</b>

Source: Mary Zambon, Riverside County Transportation Department, July 2004. Phillip Reynolds, California Transportation Department, July 2004.

As shown, costs vary widely among transportation projects. Project 1 involved a bridge retrofit over the Market Street Bridge on the Santa Ana River. Similarly, Project 2 was a bridge retrofit at the River Road Bridge. Project 2 was significantly more expensive however because it lasted more than two years and required a significant amount of work within the river bed. Project 3 involved an interchange on Interstate 10 and Interstate 215. The project has been ongoing for more than ten years and consultation with the Service was completed June 30, 2003. Total construction costs of the project are estimated at \$20 million.<sup>160</sup> Of this amount, approximately \$3 million are due to conservation measures for the SAS.

#### 6.5.1.1 Retrospective Costs

In this analysis, retrospective costs are assigned to past transportation projects that required consultation with the Service. This includes four projects from 1999 through 2003. The average cost for Projects 1 and 2 (\$143,000) was assigned to the bridge project for which no cost information was available.

#### 6.5.1.2 Prospective Costs

Future projects were estimated using a GIS coverage of past USACE permitting in the L.A. District. This coverage was intersected with the SAS critical and essential habitat boundaries to identify projects occurring within SAS habitat. In total, 49 USACE permits were issued within SAS habitat between 1999 and 2003. All permits involving construction and maintenance of transportation facilities were selected

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<sup>160</sup> Personal communication with Phillip Reynolds, California Department of Transportation, July 2004.

from this list. In total, ten permits were issued for transportation projects over the five-year period. The projects were assigned to each habitat unit using GIS analysis. In this analysis, it was assumed that all future USACE permits for road projects will require conservation measures for the SAS and that the number of future road projects can be accurately represented by the number of projects permitted between 1999 and 2003. Average costs within each habitat unit were developed according to the estimates provided above in Table 32.

### 6.5.1.3 Estimated Costs

As shown below in Table 33, the total annual impacts associated with transportation projects are approximately \$1.0 million. The majority of the costs are attributed to Unit 1B, Santa Ana Wash. Total prospective costs within the CHD are \$14.9 million and \$10.6 million using a three percent and seven percent discount rate, respectively.

**Table 33**  
**Potential Economic Impacts to Transportation Projects**

Habitat Unit	Retrospective (Total)	Prospective (Total)		Prospective (Annual)
		3%	7%	
Unit 1A – Northern Prado Basin	\$0	\$0	\$0	\$0
Unit 1B – Santa Ana Wash	\$3,430,000	\$13,824,000	\$9,844,000	\$929,000
Unit 2 – San Gabriel River	\$0	\$1,066,000	\$759,000	\$72,000
Unit 3 – Big Tujunga Creek	\$0	\$0	\$0	\$0
<b>Total CHD</b>	<b>\$3,430,000</b>	<b>\$14,890,000</b>	<b>\$10,603,000</b>	<b>\$1,001,000</b>
Excluded Lands (Essential Habitat)	\$0	\$533,000	\$380,000	\$36,000

#### 6.5.1.4 Assumptions and Uncertainties

**Table 34**  
**Assumptions and Uncertainties**

Assumption	Direction of Bias
Past USACE permitting activity for transportation projects is an accurate predictor of future transportation permitting activities.	+/-
All future USACE permits will require conservation measures for the SAS.	+
Transportation projects not requiring a USACE permit will not incur costs associated with SAS conservation measures. This assumption may understate costs as not all transportation projects affecting SAS habitat may require a permit from the USACE.	-

+: This assumption is likely to produce an upward bias in cost estimates.

-: This assumption is likely to produce a downward bias in cost estimates.

+/-: No direction of bias can be determined.

## 6.6 EFFECTS ON DAMS

There are five flood control dams and multiple hydroelectric facilities operating in and around the essential habitat units for the SAS. These dams include; Prado, Seven Oaks, Big Tujunga Creek, Hansen, and Cogswell. These dams operate for a variety of purposes, the most common of which is flood control. Three of the dams (Prado, Cogswell, and Big Tujunga) provide water conservation as well. Both Seven Oaks and Hansen dams have been considered for water conservation usage as well as flood control but have not been permitted for the activity. The potential effects to operations of the flood control and water conservation dams from SAS conservation actions include implementation of conservation measures and mitigating for perennial stream habitat loss. The potential effects to operations of hydroelectric facilities from SAS conservation measures include implementation of minimum stream flows in designated portions of river reaches. Description of specific measures and cost estimates is provided below.

### 6.6.1 FLOOD CONTROL

The Santa Ana River is the largest drainage basin in southern California. Because of its length, the Santa Ana Watershed area is at an increased risk for flood damage in times of high flows. The Santa Ana River Mainstem Project was authorized by Congress in 1986 to diminish this risk. Seven Oaks Dam and Prado Dam are two major features of the Santa Ana River Mainstem Project.<sup>161</sup> Both Seven Oaks and Prado are located on the Santa Ana River in what is considered essential habitat for the SAS by the Service.

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<sup>161</sup> Nesmith, Herb, February 2000, "Seven Oaks Marks a Milestone," U.S. Army Corps of Engineers, L.A. District, <http://www.hq.usace.army.mil/cepa/pubs/feb00/story1.htm>.

### 6.6.1.1 Prado Dam

Prado Dam has been in operation since the 1940s and is operated by the USACE, L.A. District. The Riverside and San Bernardino County divide the general area of the Prado Basin, while the Orange County line is located downstream. The dam was constructed to provide flood protection from a 100-year flood event. However, with the increase in urban runoff and accumulated sediment behind the dam, the flood control capacity has been reduced. Prado Basin is also used for water conservation for Orange County, retaining excess water behind the dam for regulated release to Orange County's spreading basins.<sup>162</sup>

The USACE, L.A. District has recently completed consultation with the Service concerning areas around Prado Dam. Past consultations have focused on the stabilization of the river banks downstream and upstream (Norco Bluffs). In total there are seven areas where the bank requires stabilization; two of these areas have been completed. USACE has been and will be required to survey the river before and after completion of each bank stabilization project. USACE is also required to restore riparian habitat affected by the project to benefit the SAS. USACE estimates that each bank stabilization project costs approximately \$50,000 for surveying, monitoring, and redesign.<sup>163</sup>

The outlet channel at Prado Dam was recently changed from a soft bottom to a longer, concrete structure as part of the Prado Mainstem Project. The Biological Opinion issued by the Service outlined conservation measures for the SAS. Conservation measures require the USACE to "create and or enhance one acre of perennial stream habitat within the Santa Ana River or its tributaries for each acre of unvegetated perennial stream that is temporarily or permanently disturbed during construction-related activities."<sup>164</sup> The total amount of disturbed perennial stream habitat associated with the project is estimated at 13.2 acres, including 9.0 acres of permanent effects and 4.2 of temporary effects. The cost of wetland area restoration activities is estimated to be approximately \$150,000 per acre but can vary widely according to location and requirements.<sup>165</sup> Using the estimate of \$150,000 per acre, mitigation expense for impacts to perennial stream habitat, directly attributable to the SAS, for the Prado Mainstem Project is \$1.98 million

Future consultations with the Service are anticipated to focus on fish passage concerns at Prado Dam. The timing and outcome of such a consultation are speculative however. In the interim, the USACE will be experimenting with a "Trap and Haul" system for the SAS. This system will include physically

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<sup>162</sup> U.S. Army Corps of Engineers, June 3, 2004, "Prado Dam Project, Executive Summary – Prado's Extreme Makeover," <http://www.spl.usace.army.mil/Pradodam/pradodam.htm>.

<sup>163</sup> Personal communication with Hayley Lovan, Biologist, U.S. Army Corps of Engineers, June 16, 2004.

<sup>164</sup> U.S. Fish and Wildlife Service, December 5, 2001, "Biological Opinion for Prado Mainstem Project," Ecological Services, FWS-SB-909.6.

<sup>165</sup> Personal communication with Michael McCollum, McCollum Associates, June 14, 2004.

trapping the SAS, and hauling them to the other side of the Dam before release.<sup>166</sup> Cost estimates have not been generated by the USACE for this measure, but are expected to be minimal and are not included in this analysis.<sup>167</sup>

#### 6.6.1.2 Seven Oaks Dam

The Seven Oaks Dam is on the Santa Ana River near the City of Highland. The dam is primarily a flood control facility and operates in tandem with Prado Dam located approximately 40 miles downstream. At the end of each flood season, Seven Oaks Dam is drained and water flows through the dam unhindered.<sup>168</sup> Since the completion of Seven Oaks in November of 1999, the dam has been operated in accordance with an interim operation plan. This plan was developed in coordination with the Service and does not identify conservation measures for the SAS.<sup>169</sup> However, a formal consultation completed in December 19, 2002 concluded that operations at Seven Oaks Dam are not likely to adversely impact the SAS.<sup>170</sup>

Future consultations may occur in the event that plans are developed for water conservation at Seven Oaks Dam. However, even then it is anticipated that few, if any, measures will be required or implemented for the SAS due to the fact that water flow in this stretch of river has not been raised as an issue of concern in the past.

#### 6.6.1.3 Big Tujunga Creek Dam

Big Tujunga Creek Dam is located in the eastern portion of Unit 3, Big Tujunga Creek, in Los Angeles County. It is operated by the Los Angeles County Department of Public Works (LADPW) and serves multiple purposes including flood control and water conservation. Water from the facility that is diverted to recharge areas is pumped for drinking water to supply the needs of Los Angeles, Glendale, and Burbank.

Presently the LADPW is in informal consultation with the Service, through the USFS (ANF). One aspect of the ongoing consultation involves modifications to the proposed rehabilitation project at the dam, which entails thickening the dam and replacing the valves. The operators of Big Tujunga Dam are anticipating additional monitoring and surveying specifically for the SAS as a result of the informal

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<sup>166</sup> Personal communication with Hayley Lovan, Biologist, U.S. Army Corps of Engineers, June 16, 2004.

<sup>167</sup> Personal communication with Hayley Lovan, Biologist, U.S. Army Corps of Engineers, June 16, 2004.

<sup>168</sup> U.S. Army Corps of Engineers, August 2, 2000 (last updated), "Seven Oaks Dam," <http://www.spl.usace.army.mil/resreg/htdocs/7oaks.html>.

<sup>169</sup> U.S. Fish and Wildlife Service, December 19, 2002, Section 7 Consultation for Operations of Seven Oaks Dam, San Bernardino County, California (1-6-02-F-1000.10).

<sup>170</sup> Ibid.

consultation and estimate that future costs will be between \$50,000 and \$100,000 per year.<sup>171</sup> Another focus of the consultation involves current water release procedures at the dam. It is expected that additional releases will be required to maximize the habitat of the SAS. (See Section 6.3.3 Water Supply for further analysis on this subject.) To help meet this requirement, the dam rehabilitation project will incur an expense of approximately \$50,000 to install a low flow valve so that releases can be made to accommodate the SAS.<sup>172</sup> This is a one-time expense.

#### 6.6.1.4 Hansen Dam

Hansen Dam is a flood control facility located in Unit 3, Big Tujunga Creek. Plans have been developed to use Hansen Dam for water conservation but they have not been implemented. Both Little Tujunga Creek and Big Tujunga Creek flow into the reservoir behind Hansen Dam (Hansen Lake). Hansen Lake (Hansen Basin) supports a population of bass and bluegill, which feed on SAS that enter the lake.<sup>173</sup> According to the Service, Hansen Lake was included in the CHD due to the difficulty in separating the Hansen Dam reservoir from Tujunga Creek.<sup>174</sup> USACE believes it is not necessary to consult with the Service for activities potentially harmful to the SAS as USACE activities are limited to the Hansen Basin and do not include the Tujunga Basin. It is possible that future consultation with the Service could be required for Hansen Dam operations if water conservation activities expand the geographical area of the reservoir and increase the habitat for non-native species that compete with or prey upon the SAS.<sup>175</sup> However, this possibility can not be predicted with the available information and as a result, this analysis assumes that Hansen Dam will not incur SAS conservation measures through future consultations with the Service.

#### 6.6.1.5 Cogswell Dam

The San Gabriel Mountains, within which Cogswell Dam is located, is one of the most erosive watersheds in the world. Therefore, sediment management in and around flood control structures and reservoirs is of utmost importance. The Cogswell Dam is located on the West Fork of the San Gabriel River and is operated by LADPW for flood control and water conservation. LADPW and the water agencies who own the rights to the flow in the West Fork and the water stored behind the dam have been proactive in conservation efforts in support of the SAS and have implemented measures to help protect aquatic species since the late 1980s.

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<sup>171</sup> Personal communication with Keith Lilley, L.A. Department of Public Works, June 14, 2004.

<sup>172</sup> Personal communication with Patricia Wood, Senior Civil Engineer, L.A. County Department of Public Works, Water Resources Division, August 4, 2004.

<sup>173</sup> Personal communication with Carvel Bass, U.S. Army Corps of Engineers, June 25, 2004.

<sup>174</sup> Personal communication with Service Biologist, Carlsbad Fish and Wildlife Office, July 7, 2004.

<sup>175</sup> Personal communication with Service Biologist, Carlsbad Fish and Wildlife Office, July 27, 2004.

The Long Term West Fork Management Plan, prepared by the USFS and signed by the California Department of Fish and Game (CDFG), LADPW, California Trout and the local water rights holders in 1989, established enhanced (above natural) flows during the dry months of the year. The incremental increase in flows recommended by the Plan is based on the water temperature needs of rainbow trout and was intended to enhance recreational fishing in the West Fork. The plan recognized that the improved flows would also benefit other aquatic species such as the SAS. However, in this analysis we do not analyze the cost of the enhanced flows because they were implemented primarily for the benefit of other species ten years prior to the listing of the SAS.

Subsequent to the Long Term West Fork Management Plan, LADPW prepared a Sediment Management Plan for all three of its reservoirs in San Gabriel Canyon, including Cogswell Reservoir. Local, State and Federal regulatory agencies approved the Sediment Management Plan in 1998. Under the Sediment Management Plan, it is anticipated that Cogswell Reservoir will be cleaned out once every ten years, on average. The cleaning process involves draining the reservoir and excavating the sediment for a period of approximately one year. This process results in an increase in the amount of sediment flowing from the dam which is deposited in pools in the West Fork below Cogswell Dam. Fish, including the SAS, congregate in these pools. Consequently, the USFS determined that sediment needed to be dredged from these pools. LADPW has been required to engage the USFS to perform pool dredges in both 1997 and 1998. It is anticipated that surveying before and after these dredging projects, as well as monitoring and relocating the SAS during the project will be required conservation measures and will cost LADPW \$250,000 per year of dredging.<sup>176</sup>

#### 6.6.1.6 Retrospective Costs

Retrospective costs associated with the SAS conservation activities include measures described for the bank stabilization projects at Prado Dam that occurred in 2003.

#### 6.6.1.7 Prospective Costs

Prospective costs include surveying monitoring and redesigning of the bank stabilization projects around Prado. Five stabilization projects are planned and this analysis assumes all five will occur within the next year. Other prospective costs at Prado Dam include mitigation for perennial stream habitat impacted during the channel extension and remodeling. Approximately 13.2 acres of perennial stream habitat will be impacted by the project and will require mitigation at an estimated cost of \$1.98 million.

Prospective costs for Big Tujunga Dam include the additional monitoring and surveying that LA Department of Public Works is anticipating as a result of ongoing informal consultation. The current

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<sup>176</sup> Personal communication with Patricia Wood, Senior Civil Engineer, L.A. County Department of Public Works, Water Resources Division, August 4, 2004.

annual estimate for these measures range between \$50,000 and \$100,000. An estimate of \$75,000 was applied in this analysis.

LADPW will implement turbidity control measures on an annual basis. Surveying, monitoring, and relocating measures will also be undertaken by LA County Department of Public Works during the dredging activities in the West Fork below Cogswell Dam. It is anticipated that the cost of these activities will be \$250,000 per event, and an event is anticipated every 10 years. This analysis assumes that 2 dredging activities will occur in the next 20 years, thus creating an average annual cost of \$25,000 (\$500,000/20).

#### 6.6.1.8 Estimated Costs

Table 35 provides a summary of the estimated costs to flood control dams.

**Table 35**  
**Potential Economic Costs to Flood Control Dams**

Habitat Unit	Retrospective (Total)	Prospective (Total)		Prospective (Annual)
		3%	7%	
Unit 1A – Northern Prado Basin	\$0	\$0	\$0	\$0
Unit 1B – Santa Ana Wash	\$0	\$0	\$0	\$0
Unit 2 – San Gabriel River	\$0	\$372,000	\$265,000	\$25,000
Unit 3 – Big Tujunga Creek	\$0	\$1,154,000	\$822,000	\$78,000
<b>Total CHD</b>	<b>\$0</b>	<b>\$1,526,000</b>	<b>\$1,087,000</b>	<b>\$103,000</b>
Excluded Lands (Essential Habitat)	\$100,000	\$1,659,000	\$1,182,000	\$112,000

Note: Numbers may not sum due to rounding.

#### 6.6.1.9 Assumptions and Uncertainties

**Table 36**  
**Assumptions and Uncertainties**

Assumption	Direction of Bias
The five remaining bank stabilization projects around Prado Dam will all occur within the first year of the prospective period	+
Any future consultations associated with Hansen Dam or Seven Oaks Dam will result in no adverse impact found to the SAS, and no conservation measures will be required	-
The flow requirements at Cogswell Dam are not a result of the listing of the SAS. They were implemented 10 years prior to the listing	-

+: This assumption is likely to produce an upward bias in cost estimates.

-: This assumption is likely to produce a downward bias in cost estimates.

+/-: No direction of bias can be determined.

## 6.6.2 HYDROELECTRIC

### 6.6.2.1 Mill Creek #2 and #3

Southern California Edison (SCE) operates the Mill Creek hydropower facility that releases flows into Unit 1B Santa Ana Wash. The Mill Creek facility, which began operating in September of 1893 is historically renowned as the first three-phased alternating current (AC) power plant in the U.S. The facility received an operating license from the Federal Energy Regulatory Commission (FERC) as a result of a relicensing process that began in 1996. Presently, the Mill Creek facility produces a very small percentage of SCE's total hydroelectric generation and has a capacity of 2.8 MW, less than two percent of SCE's total installed capacity.<sup>177</sup>

The SAS does not currently occupy the river reach below the Mill Creek facility. However, flows in the reach support important sediment transport functions for occupied SAS habitat downstream. The project also serves as a water collector and water supply conduit for local water companies. It is not clear at this point if the Mill Creek facility is located within the CHD. However, the Service has indicated that no SAS conservation measures are likely to be required at the facility provided SCE does not significantly deviate from past operational practices.<sup>178</sup> Consequently, no costs are estimated due to SAS listing and CHD.

### 6.6.2.2 Santa Ana River #1 and #3

SCE owns the Santa Ana River #1 and #3 hydroelectric facility. The run of the river facility has 6.3 MW of installed capacity. In addition to hydropower SCE completed a 10-year re-licensing process in July of 2003 that resulted in a 30-year FERC license to operate the Santa Ana River Powerhouse #1 and #3. The facility also provides a source of water for the Bear Valley Municipal Water Company and others. The re-licensing process included consultations with all resource agencies and the public prior to issuance of the FERC permit.

As part of the re-licensing process, SCE agreed to maintain minimum flows of between seven and eleven cfs downstream of the SAR #1 diversion structure.<sup>179</sup> The SAS is not known to occur in this reach of the river. However, the Santa Ana River does "provide and transport sediment necessary to maintain the

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<sup>177</sup> Personal communication with Thomas Boyd, Southern California Edison, June 16, 2004.

<sup>178</sup> Personal communication with Service Biologist, Carlsbad Fish and Wildlife Office, July 2004.

<sup>179</sup> Personal communication with Jim Edmondson, CalTrout, July 2004.

preferred substrates utilized by the fish.”<sup>180</sup> In this analysis it is assumed that the increased flow requirement was not a result of the listing or designation of the SAS. The flows were required to benefit all native fish to the Santa Ana River and would have been required with or without the SAS listing and CHD. Currently, the USFS (San Bernardino NF) is preparing an EIR/EIS for a program to introduce the SAS and other native fish species in the reach of river that is receiving the increased flows.<sup>181</sup>

## 6.7 EFFECTS ON FEDERAL AGENCIES

Federal agencies are required to consult with the Service on activities that they fund, permit, authorize, or carry out in order to avoid jeopardizing the continued existence of a listed species. When critical habitat is designated, the agencies are also required to ensure that the activity will not result in an appreciable reduction in the value of the habitat to protect the listed species. In some cases, third parties such as local government or private entities participate in the consultation process along with the Federal action agency when the proposed project has a Federal nexus.

Section 7 consultations can take a variety of forms including informal, formal and conference. Informal consultations occur when the Service, action agency, and the applicant are able to identify and resolve potential concerns to the listed species at an early stage in the planning process. In some cases, it is determined that the proposed action may adversely affect the listed species or designated critical habitat. These instances can require “formal” consultation whereby the Service issues a Biological Opinion stating if the proposed action is likely to jeopardize a species or adversely modify critical habitat and provides recommendations on appropriate conservation measures to avoid the impacts. The Service also conducts “conference” consultations that can be formal or informal. A conference consultation involves a process of early interagency cooperation involving informal or formal discussions between a Federal agency and the Services pursuant to section 7(a)(4) of the ESA regarding the likely impact of an action on proposed species or proposed critical habitat. Conferences are: (1) required for proposed Federal actions likely to jeopardize proposed species, or destroy or adversely modify proposed critical habitat; (2) designed to help Federal agencies identify and resolve potential conflicts between an action and species conservation early in a project's planning; and (3) designed to develop recommendations to minimize or avoid adverse effects to proposed species or proposed critical habitat.<sup>182</sup>

The Service has conducted two formal conferences for the SAS. In this analysis, the conferences are included as “formal.” Table 37 provides a summary of the consultation record for the SAS.

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<sup>180</sup> U.S. Fish and Wildlife Service, February 26, 2004, “Final Rule to Designate Critical Habitat for the Santa Ana Sucker (*Catostomus santaanae*),” *Federal Register*, Vol. 69, No. 38, p. 8845.

<sup>181</sup> Personal communication with Steve Lowe, Biologist, U.S. Forest Service, July 21, 2004.

<sup>182</sup> U.S. Fish and Wildlife Service and National Marine Fisheries Service, March 1998, “Consultation Handbook, Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act,” pp. xi-xii.

**Table 37**  
**Service SAS Consultations by Year and Type**

<b>Year</b>	<b>Total</b>	<b>Formal</b>	<b>Informal</b>
1999	1	1	0
2000	0	0	0
2001	5	3	2
2002	6	4	2
2003	1	0	1*
2004	0	0	0
<b>Total</b>	<b>13</b>	<b>8</b>	<b>5</b>

\* Includes emergency consultation with L.A. Department of Public Works for sediment removal in the San Gabriel Reservoir.

Section 7 consultations require a considerable amount of time and effort for the Service, action agencies, and third parties and can result in substantial administrative costs.

Table 38 presents cost estimates for the categories of consultations presented above. The costs are associated with meetings, preparation, and documentation during the consultation. In addition, average costs required to develop Biological Assessments (BAs) are included.<sup>183</sup>

**Table 38**  
**Estimated Administrative Costs of Section 7 Consultations**

	<b>Formal</b>	<b>Informal</b>
<b>Service</b>		
Consultation Cost	\$4,600	\$2,050
<b>Action Agency</b>		
Consultation Cost	\$5,200	\$2,600
BA Cost	\$17,000	\$2,000
<b>Third Party Costs</b>		
Consultation Cost	\$3,500	\$2,050

Source: Industrial Economics, Inc., analysis based on data from the Federal Government General Schedule Rates, 2002, Office of Personnel Management, and level of effort information from Service, ACOE, USFS, USBR, and DOT.

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<sup>183</sup> It is assumed that the hours required to develop the BA by the Action agency and third party are equal but that per hour costs are higher for third parties.

Total administrative costs are presented in Table 39. Prospective annual costs were calculated by multiplying the average costs per type of consultation by the number of consultations projected to occur each year.<sup>184</sup> Total prospective costs are estimated from annual costs by applying a three and seven percent discount rate over a 20-year period.

**Table 39**  
**Estimated Section 7 Administrative Costs**

	Retrospective (Total)	Prospective (Total)		Prospective (Annual)
		3%	7%	
Section 7 Administrative Costs	\$286,000	\$851,000	\$606,000	\$57,000

Many of the consultations occurred in broad areas and covered several habitat units. This analysis proportioned retrospective administrative costs to each of the appropriate habitat units. The following table shows the number of retrospective consultations assigned to each critical habitat unit for purposes of this analysis.

**Table 40**  
**Consultations per Habitat Unit**

Habitat Unit	Informal	Formal
Unit 1A – Northern Prado Basin	0.00	0.00
Unit 1B – Santa Ana Wash	1.00	0.33
Unit 2 – San Gabriel River	1.50	0.83
Unit 3 – Big Tujunga Creek	0.50	0.83
<b>Total CHD</b>	<b>3.00</b>	<b>2.00</b>
Excluded Lands (Essential Habitat)	2.00	6.00

It can not be predicted where future consultations are going to occur. As a result, prospective costs for effects on Federal agencies for each of the habitat units were estimated by dividing the total prospective costs (see Table 39) by the number of habitat units (five). This assesses annual costs on a per unit basis

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<sup>184</sup> It is assumed that future consultations will occur at the same average annual rate indicated by the consultation record.

with EL considered as one unit. The following table summarizes estimated effects on Federal agencies in regards to the SAS.

**Table 41**  
**Estimated Section 7 Administrative Costs per Habitat Unit**

<b>Habitat Unit</b>	<b>Retrospective (Total)</b>	<b>Prospective (Total)</b>		<b>Prospective (Annual)</b>
		<b>3%</b>	<b>7%</b>	
Unit 1A – Northern Prado Basin	\$0	\$170,000	\$121,000	\$11,000
Unit 1B – Santa Ana Wash	\$19,000	\$170,000	\$121,000	\$11,000
Unit 2 – San Gabriel River	\$53,000	\$170,000	\$121,000	\$11,000
Unit 3 – Big Tujunga Creek	\$29,000	\$170,000	\$121,000	\$11,000
<b>Total CHD</b>	<b>\$101,000</b>	<b>\$680,000</b>	<b>\$484,000</b>	<b>\$44,000</b>
Excluded Lands (Essential Habitat)	\$199,000	\$170,000	\$121,000	\$11,000

## **7.1 SUMMARY OF FINDINGS**

Table 42 provides a summary of the economic impacts due to SAS conservation measures in critical habitat for each of the activities analyzed in this analysis. Retrospective costs total \$4.2 million, with transportation bearing \$3.4 million of the costs. The remainder of retrospective costs were split among OHV recreation, flood control agencies, and Federal agencies.

Total prospective costs are \$30.5 million assuming a three percent discount rate and \$21.8 million with a seven percent discount rate. Annual prospective costs are estimated to be \$2.0 million. Costs associated with transportation contribute 49 percent of the annual costs and overall prospective costs. Other leading activities include water supply, flood control agencies, and residential and commercial development.

Table 43 provides a summary of the economic impacts due to SAS conservation measures in the excluded lands for each of the activities analyzed in this analysis. Retrospective costs amount to \$1.6 million, with the SAS Conservation Program contributions, costs for developing the Western Riverside MSHCP, and costs on water supply the largest components. Prospective costs are presented in the table as a range because of uncertainty about which of the SARI Line improvement alternatives will be selected. Total prospective costs are \$10.9 to \$15.3 million assuming a three percent discount rate and \$7.9 to \$11.0 million with a seven percent discount rate. Annual prospective costs are estimated to be \$0.7 to \$1.0 million. Costs associated with SARI Line improvements contribute the largest share at 29 percent of the annual costs and overall prospective costs. Other leading activities include flood control agencies, the SAS Conservation Program, residential and commercial development, flood control dams, and water supply.

Table 44 provides a combined summary of Table 42 and Table 43, and thus reflects the economic effects associated with SAS conservation measures in all essential habitat. Total retrospective costs are \$5.8 million. Total prospective cost with a three percent discount rate are \$41.4 to \$45.8 million, and with a seven percent discount rate is \$29.7 to \$32.8 million, depending upon the SARI Line improvement alternative.

**Table 42**  
**Summary of Economic Effects Associated with Santa Ana Sucker**  
**Conservation Measures in Critical Habitat**

Category of Impact	Retrospective 1999-2004 (Total)	Prospective 2004-2024 (Total)		Prospective Annual
		3%	7%	
Residential/Commercial Development	\$0	\$2,169,000	\$1,656,000	\$138,000
SAS Conservation Program Contributions	\$0	\$0	\$0	\$0
Commercial Mining	\$0	\$0	\$0	\$0
Water Treatment Facilities	\$0	\$595,000	\$424,000	\$40,000
Santa Ana River Interceptor (SARI) Line	\$0	\$0	\$0	\$0
Water Supply	\$0	\$7,097,000	\$5,053,000	\$477,000
Flood Control Agencies	\$250,000	\$2,232,000	\$1,589,000	\$150,000
Recreational Mining	\$0	\$0	\$0	\$0
Off-Highway Vehicle (OHV) Recreation	\$378,000	\$1,336,000	\$951,000	\$90,000
Other Recreation	\$0	\$0	\$0	\$0
Transportation	\$3,430,000	\$14,890,000	\$10,603,000	\$1,001,000
Dams - Flood Control	\$0	\$1,526,000	\$1,087,000	\$103,000
Dams - Hydroelectric	\$0	\$0	\$0	\$0
Riverside MSHCP Preparation	\$0	\$0	\$0	\$0
Federal Agencies	\$101,000	\$680,000	\$484,000	\$44,000
<b>Total Estimated Costs to CHD</b>	<b>\$4,159,000</b>	<b>\$30,525,000</b>	<b>\$21,847,000</b>	<b>\$2,043,000</b>

Note: Numbers may not sum due to rounding.

**Table 43**  
**Summary of Economic Effects Associated with Santa Ana Sucker**  
**Conservation Measures in Excluded Lands**

Category of Impact	Retrospective 1999-2004 (Total)	Prospective 2004-2024 (Total)		Prospective Annual
		3%	7%	
Residential/Commercial Development	\$0	\$1,717,000	\$1,305,000	\$107,000
SAS Conservation Program Contribution	\$520,000	\$1,934,000	\$1,377,000	\$130,000
Commercial Mining	\$0	\$0	\$0	\$0
Water Treatment Facilities	\$27,000	\$827,000	\$589,000	\$56,000
Santa Ana River Interceptor (SARI) Line	\$7,000	\$0 - \$4,389,000	\$0 - \$3,125,000	\$0 - \$295,000
Water Supply	\$309,000	\$1,337,000	\$952,000	\$90,000
Flood Control Agencies	\$89,000	\$2,739,000	\$1,951,000	\$184,000
Recreational Mining	\$0	\$0	\$0	\$0
Off-Highway Vehicle (OHV) Recreation	\$0	\$0	\$0	\$0
Other Recreation	\$0	\$0	\$0	\$0
Transportation	\$0	\$533,000	\$380,000	\$36,000
Dams - Flood Control	\$100,000	\$1,659,000	\$1,182,000	\$112,000
Dams - Hydroelectric	\$0	\$0	\$0	\$0
Riverside MSHCP Preparation	\$367,000	\$0	\$0	\$0
Federal Agencies	\$199,000	\$170,000	\$121,000	\$11,000
<b>Total Estimated Costs to EL</b>	<b>\$1,618,000</b>	<b>\$10,916,000 - \$15,305,000</b>	<b>\$7,857,000 - \$10,982,000</b>	<b>\$726,000 - \$1,021,000</b>

Note: Numbers may not sum due to rounding.

**Table 44**  
**Summary of Economic Effects Associated with Santa Ana Sucker**  
**Conservation Measures in All Essential Habitat**

Category of Impact	Retrospective 1999-2004 (Total)	Prospective 2004-2024 (Total)		Prospective Annual
		3%	7%	
Total Estimated Costs to Essential Habitat	\$5,777,000	\$41,441,000 - \$45,830,000	\$29,704,000 - \$32,829,000	\$2,769,000 - \$3,064,000

Table 45 provides a summary of the total costs to each SAS habitat unit. The costs include all of the categories of impacts provided in the tables above. Some of the section 7 costs to Federal agencies were distributed proportionally among the CHD and EL due to the difficulty in predicting where and when future consultations will occur.

Retrospective costs range from \$0 in Unit 1A, Northern Prado Basin, to \$3.4 million in Unit 1B, Santa Ana Wash. Unit 1B, Santa Ana Wash, has incurred the highest retrospective costs due to SAS listing. These costs primarily stem from transportation projects within the unit that have required SAS conservation measures. Within the CHD, total prospective costs are highest in Unit 1B, Santa Ana Wash (\$15.6 million using a three percent discount rate and \$11.2 million using seven percent), and the lowest in Unit 1A, Northern Prado Basin (\$1.1 million using a three percent discount rate and \$0.8 million using a seven percent discount rate). All EL are estimated to incur prospective costs ranging from \$10.9 to \$15.3 million, or \$7.9 to \$11.0 million using three and seven percent discount rates, respectively. The relatively high costs and range of costs in the EL are primarily attributable to the SARI Line and flood control activities. Estimated annual costs within the CHD range from \$72,000 in Unit 1A, Northern Prado Basin, to \$1.0 million in Unit 1B, Santa Ana Wash. Annual costs to EL are estimated in the range of \$725,000 to \$1.02 million.

**Table 45**  
**Potential Total Economic Impacts by SAS Habitat Unit**

Habitat Unit	Retrospective (Total)	Prospective (Total)		Prospective (Annual)
		3%	7%	
Unit 1A – Northern Prado Basin	\$0	\$1,109,000	\$821,000	\$72,000
Unit 1B – Santa Ana Wash	\$3,449,000	\$15,620,000	\$11,188,000	\$1,045,000
Unit 2 – San Gabriel River	\$681,000	\$5,176,000	\$3,685,000	\$348,000
Unit 3 – Big Tujunga Creek	\$29,000	\$8,620,000	\$6,153,000	\$578,000
<b>Total CHD</b>	<b>\$4,159,000</b>	<b>\$30,525,000</b>	<b>\$21,848,000</b>	<b>\$2,043,000</b>
Excluded Land (Essential Habitat)	\$1,618,000	\$10,915,000 - \$15,304,000	\$7,857,000 - \$10,982,000	\$725,000 - \$1,020,000

Note: Numbers may not sum due to rounding.

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## APPENDIX A: ECONOMIC EFFECTS TO SMALL ENTITIES AND ENERGY

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This appendix contains an examination of the extent to which the analytic results presented in the main report reflect impacts to small entities. The analysis of the effect on small entities is conducted pursuant to the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996. The appendix also contains an analysis of the effects of the rulemaking on energy markets, as required by Executive Order No. 13211.

### POTENTIAL EFFECTS ON SMALL ENTITIES

Under the RFA (as amended by SBREFA), whenever a Federal agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effect of the rule on small entities. However, no regulatory flexibility analysis is required if the head of an agency certifies that the rule will not have a significant economic impact on a substantial number of small entities.<sup>185</sup> SBREFA amended the RFA to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have a significant economic impact on a substantial number of small entities. Accordingly, the following represents a screening level analysis of the potential effects of CHD on small entities.

Small entities include small businesses, small governments, or small organizations, as defined by the U.S. Small Business Administration (SBA). Size standards for small businesses are established for different types of economic activity or industry within the North American Industry Classification System (NAICS), and are commonly expressed in terms of the number of employees or annual receipts. These size standards were most recently published by the SBA in “Table of Small Business Size Standards Matched to North American Industry Classification System Codes,” effective January 28, 2004.<sup>186</sup> Small organizations are defined as “any non-profit enterprise ... which is independently owned and operated and not dominant in its field.”<sup>187</sup> These may include organizations such as irrigation districts, water associations, public utilities, or agricultural co-ops. A small government is defined as any government serving populations of 50,000 or less, and might include county, city, town, or school district governments.

This analysis is intended to facilitate determination of whether this critical habitat designation potentially affects a “substantial number” of small entities in counties and/or supporting critical habitat areas. It is

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<sup>185</sup> Thus, for a regulatory flexibility analysis to be required, impacts must exceed a threshold for “significant impact” *and* a threshold for a “substantial number of small entities.” See 5 U.S.C. § 605(b).

<sup>186</sup> This table and other information on size standards are available from <http://www.sba.gov/size>.

<sup>187</sup> Regulatory Flexibility Act, 5 U.S.C. § 601 *et seq.*

also intended to quantify, to the extent possible, the probable number of small entities that are likely to experience a “significant effect.”

Federal courts have held that an RFA analysis should be limited to impacts on entities subject to the requirements of the regulation (i.e., participants in the section 7 consultation process).<sup>188</sup> These entities include participants in the section 7 consultation process, but not entities suffering the downstream effects of consultation outcomes. In spite of these rulings, in its guidance to Federal agencies on conducting screening analyses, the SBA recommends considering impacts to entities that may be indirectly affected by the proposed regulation.<sup>189</sup>

In the sections that follow, a screening process is used to identify and describe the small entities that would be subject to this analysis. This is followed by a determination of the effects on the small entities.

## DEFINITION OF SMALL ENTITIES

The SBA defines three types of “small entities:” small business, small organization, and small governmental organization. Within the category of small business, the SBA has developed size standards that vary depending upon the business type. For most industries, the size standard is based upon annual revenue for the business. The revenue standard varies from \$750,000 for agriculture to \$28.5 million for general and heavy construction. The size standard is based on number of employees for two industry types: manufacturing (500 employees) and wholesale trade (100 employees). The SBA publishes a table of current small business size standards on their website ([www.sba.gov/size](http://www.sba.gov/size)).<sup>190</sup> The SBA definition “small government organization” includes governments of cities or counties with a population of fewer than 50,000 persons.

## IDENTIFICATION OF ACTIVITIES THAT MAY INVOLVE SMALL ENTITIES

The analysis in the main report determined that costs involving conservation measures for the SAS would be incurred for activities involving residential and commercial development, water treatment facilities, the Santa Ana River Interceptor (SARI) line, water supply, flood control agencies, off-highway vehicle (OHV) recreation, transportation, flood control dams, and federal agencies. This section considers the extent to which the costs presented in the main report reflect impacts to small entities.

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<sup>188</sup> U.S. Small Business Administration, Office of Advocacy, May 2003, “A Guide for Government Agencies: How to Comply with the Regulatory Flexibility Act,” pp. 69-70.

<sup>189</sup> U.S. Small Business Administration, Office of Advocacy, May 2003, “A Guide for Government Agencies: How to Comply with the Regulatory Flexibility Act.”

<sup>190</sup> U.S. Small Business Administration, “Table of Small Business Size Standards Matched to North American Industry Classification System Codes,” January 28, 2004, [http:// www.sba.gov/size/index.html](http://www.sba.gov/size/index.html).

## Residential and Commercial Development

CHD is expected to result in additional costs to real estate development projects in terms of mitigation and monitoring costs that may be required. Some of the affected land may be in ownership by individuals who undertake a development project on their own, or by individuals holding land for investment purposes. Individuals may not be businesses; as such, they would not fall within the criteria of the screening process under the RFA. In this analysis, all of the affected landowners are assumed to be development companies. This will likely overstate the actual impacts to development related sectors.

## Water Treatment Facilities

There are nine water treatment facilities permitted under the National Pollutant Discharge Elimination System (NPDES) program that discharge effluent into, or upstream of, SAS critical and essential habitat. The facilities require certain conservation measures, in addition to those already required by the Clean Water Act, that could be attributable to protection of the SAS. However, all the facilities are owned by cities or regional governments that do not qualify as small entities, and are therefore not considered in this analysis.

## Santa Ana River Interceptor (SARI) Line

The SARI Line is a structural system designed to transport brine and non-reclaimable wastewater from the upper Santa Ana River basin to the ocean. The Orange County Sanitation District and Santa Ana Watershed Project Authority (SAWPA) are two quasi-public entities that operate the SARI Line; both agencies serve populations larger than 50,000 and therefore do not qualify as small entities.

## Water Supply

The SAS listing and CHD may affect water supply facilities and agencies through conservation measures and reductions in the volume of water used for aquifer storage and recovery programs. Only Unit 2, the Big Tujunga Creek, within the CHD will incur any prospective costs. These are associated with an anticipated need to acquire replacement water as a result of increased water releases from the Big Tujunga Dam. The dam is owned by the LAPDW, which services a population larger than the threshold for small entities. Costs may also be incurred in the EL by large water districts in Orange and Riverside Counties. None of the water districts is considered in this analysis.

## Flood Control Agencies

There are three flood control districts involved with the Sucker Conservation Program. The costs associated with their participation are assigned to the excluded lands. LAPDW manages flood control operations in the San Gabriel River, and consulted with the Service on emergency sediment removal in order to avoid harm to the SAS. All of the flood control districts involved serve large populations, and are not considered further in this analysis.

## Off-Highway Vehicle (OHV) Recreation

OHV recreation is a popular and predominant activity in both the Angeles and San Bernardino National Forests, which encompasses some of the critical habitat areas. However, nearly all of the overlapping OHV activity and critical habitat occurs in the West Fork of the San Gabriel River, which is Unit 2. The Forest Service has been active the past three years in addressing OHV related impacts, and has coordinated with the Service, California Department of Fish and Game, and a local OHV club to develop “avoidance criteria” and SAS education programs. These efforts, and the costs associated with protection and conservation, are expected to increase in the future as a result of the CHD. Businesses that are involved directly in OHV recreation, such as OHV rental and retail outlets, could be affected in theory by SAS conservation measures if visitation were expected to change; however, no reduction in visitation is anticipated. The costs of conservation measures for the SAS conservation measures involving OHV recreation would be incurred by the USFS in operations of OHV park facilities. As such, no SAS conservation measure costs associated with OHV recreation are anticipated to directly affect small entities.

## Road Maintenance and Transportation

Effects on road maintenance and transportation include costs of conservation measures associated with road widening, bridge reconstruction, and maintenance of existing infrastructure. The conservation measures include consultation with the Service, sediment control, spill prevention, monitoring, SAS relocation, and other such medications. The costs would be incurred by either the Riverside County Transportation Department or the California Transportation Department (Caltrans), both of which exceed the size threshold for small entities.

## Dams - Flood Control

There are five flood control dams operating in and around the critical and essential habitat units for the SAS. The potential effects to operations of the flood control and water conservation dams from SAS listing and CHD include implementation of conservation measures and mitigating for perennial stream habitat loss. The facilities are operated by the USACE or owned by the LADPW, and do qualify as small entities.

In summary, only businesses that are involved with land development are considered further in this analysis. In all other cost categories, the affected entities exceed the SBA size criteria for small entities. For businesses that are involved with land development, the relevant threshold for small businesses is an annual revenue of \$6 million or less.<sup>191</sup> The North American Industry Classification System (NAICS codes) 237210 is comprised of establishments primarily engaged in servicing land (e.g., excavation,

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<sup>191</sup> U.S. Small Business Administration, “Table of Small Business Size Standards Matched to North American Industry Classification System Codes,” January 28, 2004, p. 4.

installing roads and utilities) and subdividing real property into lots for subsequent sale to builders. Land subdivision precedes actual construction, and typically includes residential but may also include commercial properties.

## ESTIMATED NUMBER OF POTENTIALLY AFFECTED SMALL ENTITIES

Information on establishments and small businesses in Metropolitan Statistical Areas (MSAs) containing critical habitat is available from the SBA, as is shown in Table A-1. The MSAs that are relevant for the essential habitat (containing both critical habitat and excluded lands) are Los Angeles-Long Beach (Los Angeles County), Orange (Orange County), and Riverside-San Bernardino (Riverside and San Bernardino counties). The CHD is contained in only Los Angeles and San Bernardino counties. In addition, specific data land development businesses in each county are available from Dun and Bradstreet. As shown in Table A-1, small businesses predominate among land developers in the affected counties. Within the two counties (Los Angeles and San Bernardino) containing critical habitat, there are a total of 2,852 small businesses that are classified as land developers.

**Table A-1**  
**All Establishments, Construction Establishments, and Development Businesses**  
**in Los Angeles, Orange, Riverside, and San Bernardino Counties**

	County			
	Los Angeles	Orange	Riverside	San Bernardino
All Establishments	226,282	78,556	53,644	
Fewer than 20 Employees	170,051	56,788	37,580	
Construction Establishments <sup>a/</sup>	12,197	6,145	6,236	
Fewer than 20 Employees	10,691	5,180	5,322	
Land Development Businesses	2,709	1,255	424	256
Number of Small Businesses <sup>b/</sup>	2,607	1,192	395	245

a/ Establishments classified by the NAICS code 23. Within this larger classification code is "Land Subdivision," NAICS code 237210.

b/ Defined by the Small Business Administration as businesses with annual revenue of \$6 million or less.

Source: U.S. Small Business Administration, Office of Advocacy, July 2004, "Firm Size Data: Statistics of U.S. Businesses and Nonemployer Statistics," <http://www.sba.gov/ADVO/stats/data.html>; and Dun and Bradstreet, January 2004, accessed through a Dialog search of File 516, Dun and Bradstreet, "Dun's Market Identifiers."

Table A-2 provides details on the number and sales profiles of small and large land development businesses. In the four counties containing essential habitat (critical habitat and excluded lands), small businesses 93 to 96 percent of all land developers, but only 36 to 51 percent of annual sales.

**Table A-2**  
**Profile of Land Development Businesses (NAICS 237210)**  
**in Los Angeles, Orange, Riverside, and San Bernardino Counties,**  
**Number and Sales**

	County			
	Los Angeles	Orange	Riverside	San Bernardino
Small Businesses: <sup>a/</sup>				
Number of small businesses	2,607	1,192	395	245
Annual Sales (in millions)	\$4,247.4	\$1,960.2	\$643.5	\$376.8
Average annual sales (in millions)	\$1.6	\$1.6	\$1.6	\$1.5
Large Businesses:				
Number of large businesses	102	63	29	11
Annual Sales (in millions)	\$4,110.5	\$2,562.6	\$1,168.7	\$418.4
Average annual sales (in millions)	\$40.3	\$40.7	\$40.3	\$38.0
Total:				
Number of businesses	2,709	1,255	424	256
<i>Small as percent of total</i>	96%	95%	93%	96%
Annual Sales (in millions)	\$8,357.9	\$4,522.7	\$1,812.2	\$795.2
<i>Small as percent of total</i>	51%	43%	36%	47%
Average annual sales (in millions)	\$3.1	\$3.6	\$4.3	\$3.1

a/ Defined by the Small Business Administration as businesses with annual revenue of \$6 million or less.

Source: Dun and Bradstreet, January 2004, accessed through a Dialog search of File 516, Dun and Bradstreet, "Dun's Market Identifiers."

Within the two counties (Los Angeles and San Bernardino) containing critical habitat, there are 60 city governments (49 in Los Angeles, 11 in San Bernardino) containing 50,000 or fewer residents, which meet the criteria for "small entity." Among those cities, only one – Highland, in San Bernardino County – is adjacent to any habitat unit and potentially affected by the CHD.

#### ESTIMATED EFFECTS ON SMALL ENTITIES

According to the development effects model presented in section 5.0 of the main report, an average of 15.3 acres would be developed per year within critical habitat units, and an additional 15.3 acres within the essential habitat EL (see Table 9). The annual prospective cost associated with this development is \$138,000 within the CHD and \$107,000 within the EL. Table A-3 provides a summary of the anticipated annual development costs (mitigation (Table 11) and monitoring and management (Table 12)) distributed

by county. These costs are compared to revenues and average sales of small businesses in order to estimate the effects on small businesses.

The effects on small businesses in the land development sector would be concentrated in San Bernardino, where most of the development (Unit 1A, Northern Prado Basin; Unit 1B, Santa Ana Wash; and some EL) is expected to take place. Based on the estimated costs to development and the average sales per small business, the annual costs ranges from 0.13 percent to 3.97 percent of sales for a small firm in the land development sector depending upon county.

**Table A-3**  
**Effects on Small Businesses in the Land Development Sector**  
**within Santa Ana Sucker Essential Habitat**

	County			
	Los Angeles	Orange	Riverside	San Bernardino
Prospective Costs (Annual):				
Mitigation	\$11,000	\$4,000	\$83,000	\$114,000
Management and Monitoring	\$2,000	\$1,000	\$15,000	\$15,000
<b>Total Annual Costs</b>	<b>\$12,000</b>	<b>\$5,000</b>	<b>\$98,000</b>	<b>\$129,000</b>
Percent of Sector Revenues Attributable to Small Businesses <sup>a/</sup>	51%	43%	36%	47%
Effects on Small Businesses	\$6,098	\$2,167	\$34,799	\$61,126
Average Annual Sales per Small Business <sup>a/</sup>	\$1,629,229	\$1,644,463	\$1,629,114	\$1,537,959
Effects as a Percent of Small Business Sales	0.37%	0.13%	2.14%	3.97%

a/ From Table A-2.

## Other Small Entities

Only one small local government, the city of Highland, is located adjacent to the CHD. There is no record of consultations between the Service and the city of Highland regarding the SAS since it was listed in 1999. Indeed, it is not likely that the city would be involved in a land development project involving a section 7 consultation, although it may be involved in land use planning or permitting, and may play a role as an interested party in infrastructure projects. Any cost associated with this activity is anticipated to be a very small portion of the city's budget.

## POTENTIAL EFFECTS ON ENERGY SUPPLY

Executive Order No. 13211, “Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use,” issued May 18, 2001 requires Federal agencies to submit a “Statement of Energy Effects” for all “significant energy actions” in order to present consideration of the impacts of a regulation on the supply, distribution, and use of energy.<sup>192</sup> Significant adverse effects are defined in the EO by the OMB according to the following criteria:

1. Reductions in crude oil supply in excess of 10,000 barrels per day;
2. Reductions in fuel production in excess of 4,000 barrels per day;
3. Reductions in coal production in excess of five million tons per year;
4. Reductions in natural gas production in excess of 25 million mcf per year;
5. Reductions in electricity production in excess of one billion kilowatt-hours per year or in excess of 500 megawatts of installed capacity;
6. Increases in energy use required by the regulatory action that exceed any of the thresholds above;
7. Increases in the cost of energy production in excess of one percent;
8. Increases in the cost of energy distribution in excess of one percent; or
9. Other similarly adverse outcomes.

The CHD is expected to have minimal impacts on the energy industry. There is a very small likelihood of energy-related impacts occurring in essential habitat of the size established by the criteria. Utility corridors already exist in the essential habitat, and regulatory cost evidence does not exist to suggest that any project modifications were part of section 7 consultations.

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<sup>192</sup> Daniels, Mitchel E., July 13, 2001, “Memorandum for Heads of Executive Departments and Agencies, and Independent Regulatory Agencies,” M-01-27, <http://www.whitehouse.gov/omb/memoranda/m01-27.html>.

## **COSTS OF DEVELOPMENT RESTRICTIONS**

When development is prohibited in certain areas as a result of species conservation, it may reduce the value of the affected land. This reduction in property value represents a cost to landowners. There are two classes of models that economists use to evaluate such costs. One is the “closed city model” and the other is the “open city model.” The closed city model assumes that the number of households in a city is fixed and migration does not occur when economic conditions change in the city. The open city model assumes that the number of households in a city is determined in a multi-city equilibrium. Therefore, households are free to move from one city to another, and will choose their residential place to maximize their utility. Given that housing markets in U.S. cities feature a large volume of in- and out-migration, the open city model seems to provide a more accurate and realistic description of the development process in the four southern California counties examined here. Based on this premise and technical reviewers’ comments on previous analyses of CHD, the open city model is judged to be appropriate to measure the cost associated with land use restrictions, should such restrictions arise with conservation measures for the SAS. In our assessments of CHD, we model household and landowner decisions by expanding the stochastic city model developed by Capazza and Helsley (1990). To provide an overview of how this type of model can be implemented in the case of an effect on land values, the following description of key relationships is provided. As in Capazza and Helsley (1990), we assume that there is an identifiable Central Business District (CBD), to which all households commute daily. Locations are indexed by their distance from the CBD ( $z$ ).

In a competitive market, the price of land equals the expected present value of future land rents. Specifically, the price of agricultural land at a given location equals the present value of agricultural rent up to the time of conversion plus the present value of urban rent from the time of conversion onward. Assuming that landowners choose the conversion time to maximize the expected value of land, we can derive the price of agricultural land as:

$$(A1) \quad P^a(t, z) = \frac{R_a}{r} + \frac{g}{r^2} e^{-\alpha(z^* - z)} + \frac{r - \alpha g}{\alpha r^2} e^{-\alpha(z^* - z)}$$

$R_a$  = the rent of agricultural land

$r$  = the discount rate

$g$  = income growth rate

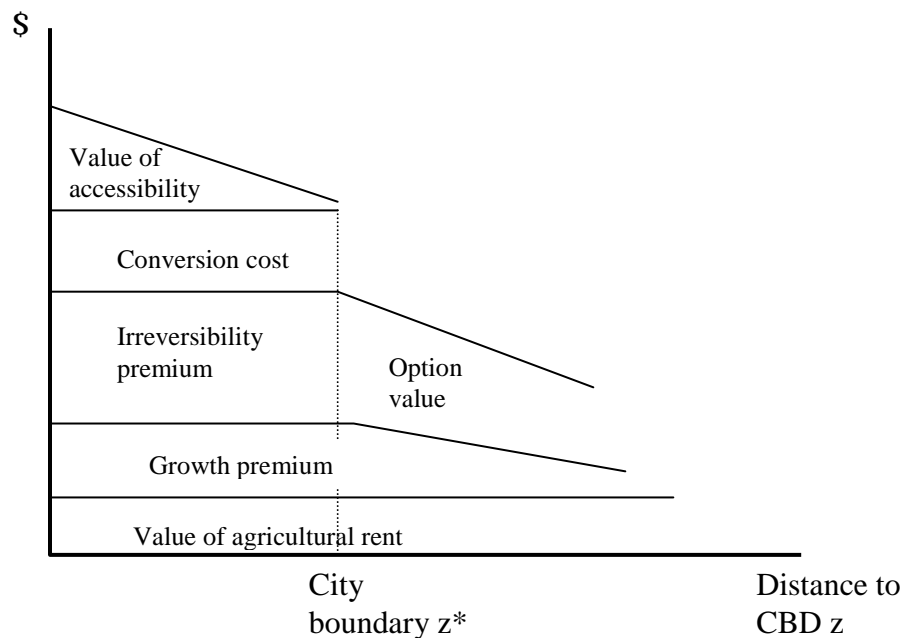
$z^*$  = the distance from the city boundary to the city center

The price of agricultural land has three components. Capozza and Helsley (1990) refer to these components as (1) the value of agricultural rents, (2) growth premium, and (3) option value of potential development. Both the growth premium and the option value decrease as the distance from the boundary of the urban area increases and the time of development moves further into the future. Both also decrease as the property tax rate increases. The price of urban land can be derived as:

$$(A2) \quad P^u(t, z) = \frac{1}{r} \left\{ R_a + rC + \frac{g}{r} + \frac{r - \alpha g}{\alpha r} + \frac{z^*(t) - z}{(1 + \tau_t)} \right\}$$

In this formula,  $C$  is the capital cost of converting a unit of land to urban use. The price of urban land consists of the value of agricultural rents, the cost of conversion, the growth premium, the irreversibility premium, and the value of accessibility. Graphically, the prices of urban and agricultural land are illustrated as follows in Figure C-1:

**Figure C-1**  
**Graphical Representation of the Components of Land Price (Value)**



Consider the cost of land use restrictions due to a CHD to landowners in the following scenarios:

- a) A piece of agricultural land is prohibited from being farmed or developed in the future. The cost to the landowner is given by (A1).
- b) A piece of agricultural land is prohibited from being developed in the future, but can be farmed. The cost to landowner in this case is given by:

$$\left[ P^a(t, z) - \frac{A}{r} \right] = \frac{g}{r^2} e^{-\alpha(z^* - z)} + \frac{r - \alpha g}{\alpha r^2} e^{-\alpha(z^* - z)}$$

- c) A piece of urban land is prohibited from being farmed or developed. The cost to landowner is given by (A2).

## **COST OF PROJECT MODIFICATIONS TO RESIDENTIAL AND COMMERCIAL DEVELOPMENT**

The net present value approach is used to measure the cost of project modifications to past and future developments that may be associated with designation of critical habitat. This approach allows us to estimate the cost by different types of development (e.g., commercial, residential) and by region (e.g., a particular river basin). The framework requires several pieces of information, including: a) projected acres of each type of development in each area designated for critical habitat, b) percent of development actually “burdened” by the requirements, and c) per-acre costs of project modification for the “burdened” development. With these data, the prospective cost of CHD for commercial and residential development during a given time period (e.g., from 2004 to 2024) can be estimated by the following formula, where total cost (TC) is measured in 2003 dollars:

$$(A3) \quad TC = \sum_{t=2004}^{2023} \sum_{i=1}^I \frac{A_t^i S_t^i C_t^i}{(1+r)^{t-2004}}$$

$i =$  types of development (e.g., low-density residential, high-density residential, commercial, mixed development, etc.)

$A_t^i =$  projected acres of type  $i$  development in year  $t$

$S_t^i =$  percent of type- $i$  development actually burdened

$C_t^i =$  per-acre or per unit project modification cost

$r =$  discount rate

Likewise, the retrospective cost of habitat designation for commercial and residential development during a given time period (e.g., from 1999 to 2004) can be estimated by the following formula, where the retrospective cost is also measured in 2003 dollars:

$$(A4) \quad TC = \sum_{t=1999}^{2004} \sum_{i=1}^I [A_t^i S_t^i C_t^i (1+r)^{2004-t}]$$

## APPENDIX C:

### AMENITY VALUES (NEGATIVE COSTS) ASSOCIATED WITH SAS CONSERVATION MEASURES

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#### INTRODUCTION

As noted in Section 1.2.4 of the main report, the published economics literature has documented that real social welfare benefits can result from conservation and recovery of endangered and threatened species. OMB directs Federal agencies to provide an assessment of costs and benefits of proposed regulatory actions, but acknowledges that often, it may not be feasible to monetize, or even quantify, the benefits of environmental regulations.<sup>193</sup> However, the analyses reported in the main report do recognize the potential positive values that may be associated with CHD; correct economic assessment of the costs of a CHD should include all identifiable and measurable costs, including the negative costs. In this appendix, we introduce an approach to estimating the amenity value, or negative costs, associated with SAS conservation measures.

#### FRAMEWORK FOR AMENITY VALUE EFFECTS

When some areas in a riparian area are designated for critical habitat, they may generate amenity values to adjacent property owners and residents. These amenity values are derived from the associated recreational opportunities, visual amenities, and other environmental and ecosystem benefits that may arise from the CHD. The existence and magnitude of economic values for environmental amenities are well documented in the environmental economics literature. If a CHD provides additional protection of the area, habitat, or ecosystem from which such environmental services may flow, the existence of positive values (benefits) from a CHD is possible.

In the case of a CHD, owners of adjacent or nearby residential property may benefit from the “internalization” of the environmental public goods arising from the CHD. However, the extent of the impact on the welfare of owners of undeveloped land and developers in general is not always clear. For example, landowners and developers would not have an incentive to provide open space or related amenities unless they could capture some of the resulting value in the price of lots and houses. Some land developers of larger areas have voluntarily set aside portions of the potential development as open space, and have built in price premiums in remaining parcels to account for the advertised amenity. However, owners of smaller parcels would have to engage in cooperative behavior with adjacent property owners to provide sufficient open space to provide price premiums adequate to offset the loss of revenue from reduced numbers of developable lots.

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<sup>193</sup> U.S. Office of Management and Budget, February 3, 2003, “Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations; Notice,” *Federal Register*, Vol. 68, No. 22, p. 5492; and U.S. Office of Management and Budget, March 22, 2000, “Appendix 4: Guidelines to Standardize Measure of Costs and Benefits and the Format of Accounting Statements,” in *Report to Congress on the Costs and Benefits of Federal Regulations*.

## **BACKGROUND LITERATURE ON AMENITY VALUE ESTIMATION**

There is a large body of literature that estimates the effect of amenities (or disamenities) on nearby property values. For example, the hedonic price model has been applied to estimate the value of property proximity to oceans, lakes, or rivers (Lansford and Jones 1995; Leggett and Bockstael 2000), urban parks and forests (Weicher and Zerbst 1973; Tyrväinen and Miettinen 2000), urban wetlands (Mahan, Polasky, and Adams 2000), and general indicators of open space (Irwin and Bockstael 2001; Riddel 2001; Geoghegan 2002; Irwin 2002). One study of particular interest for valuing amenities associated with CHDs involving stream corridors is by Streiner and Loomis (1995). The authors estimate the value of urban stream habitat improvements in northern California, where value is measured in terms of increased property values, and find values amounting to 3 to 13 percent increases in property values, depending upon the nature of stream corridor changes and how the various amenity values are “bundled.” In addition, there have been a number of studies on amenity values in the Pacific Northwest that support the existence of positive values from open space and other aspects of stream corridors. For example, Mahan, Polasky, and Adams (2000) found that urban wetlands and associated open space increased the value of residential property in Portland, Oregon. Wu, Adams, and Plantinga (2004), in another empirical study of the Portland real estate market, estimated that a five percent increase in land areas in parks and open space in a neighborhood (defined by zip code) increased the property value of an average house by \$1,050. A study by Mooney (1997) reported disamenity values (costs) to property owners near stream corridors from streamside planting of trees (for stream bank stability). She associated the decline in property values to a loss of stream view and other visual amenities due to the growth of the trees. In a study of particular relevance to the SAS CHD, Colby and Wishart (2002) estimated the value to property arising from proximity to open space provided by streambeds, arroyos, and dry washes in the city of Tucson, Arizona. The authors found that existence of permanent easements and other policies to protect these areas increased the property values of home within one-half mile of the streambed by an average of five percent.

The formal theory for valuing environmental goods as implicit prices using a hedonic price technique is developed in Freeman (2003). He also presents several hedonic price models in the context of the housing market. The theory and use of the hedonic method focused on the housing market and environmental amenities is also presented in Champ, Boyle, and Brown (2003). Both sources present standards that are appropriate for the application of these models to environmental goods, as well as guidance in the interpretation of results.

## **BENEFITS TRANSFER APPLIED TO SAS CONSERVATION MEASURES**

It is well documented that open space and location near stream corridors or water generates a premium in residential property values. These values have been demonstrated in a wide variety of settings and have been assessed with a number of non-market valuation techniques. Time and resource constraints prohibit the performance of an original research effort to measure amenity values associated with SAS conservation activities. Instead, potential amenity values arising from SAS conservation activities are quantified here via the “benefits transfer” approach. This approach essentially “borrows” estimates of

value for the same non-marketed commodity (e.g., open space) from extant studies and applies them to a new site or setting. The conditions under which such procedures are valid are well discussed in the literature (see, for example, Brookshire and Neill). The OMB also provides guidance for an appropriate use of benefits transfer methods, including criteria for their use.<sup>194</sup> In general, however, the closer the two sites are in terms of key physical and economic factors, the more likely it is that the transferred value is appropriate for the new setting. In addition, the literature cautions that values be used conservatively; i.e., that among those previous estimates judged to be appropriate, lower bound estimates should be used for the new application or setting. Finally, it is necessary that the estimates be taken from studies that have been subjected to peer review.

In this current application, we use estimates from Streiner and Loomis (1995) to evaluate the potential amenity values that may arise from conservation measures attributable to the SAS CHD. The range of estimates by Streiner and Loomis is consistent with a large volume of literature addressing comparable goods. In keeping with the general procedures for such benefit transfers, we use low range estimates from this study for a set of amenities most likely to arise from a CHD to assign amenity values to the SAS conservation measures. However, as cited in Section 5.1, there has not been any conservation measures or restrictions imposed on residential development in the areas proposed to be designated. The amenity values generated here are therefore speculative because of the uncertainty associated with the outcome of future section 7 consultations resulting from this designation. In addition, the Colby and Wishart study, which provides results of similar magnitude, corroborates the Streiner and Loomis estimates. The Colby and Wishart study is particularly relevant for this study because Tucson, Arizona, has similar topography and climatic conditions as the Santa Ana region.

## CONSIDERATION OF OMB GUIDANCE

As noted earlier, the OMB provides guidance in the development of regulatory analysis, including criteria for the appropriate use of benefits transfer methods as a method for estimating non-market benefits. These criteria were considered in the selection of the studies that were applied to the amenity value estimation of SAS conservation measures. In general, OMB recommends that benefits transfer should be considered a “last resort” option and not be used without explicit justification, and cautions that the results obtained are often associated with “uncertainties and potential biases of unknown magnitude.”<sup>195</sup> In addition, EPA provides guidance in the general application of hedonic property value studies to benefits assessment, including considerations in evaluating and applying these studies.<sup>196</sup> The guidance from these two documents, and the applicability of the Streiner and Loomis study, is summarized below.

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<sup>194</sup> U.S. Office of Management and Budget, September 17, 2003, “Circular A-4,” <http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf>.

<sup>195</sup> Ibid., p. 24.

<sup>196</sup> U.S. Environmental Protection Agency, September 2000, “Guidelines for Preparing Economic Analyses,” EPA 204-R-00-003.

- ♦ Study should be based on adequate data and sound and defensible empirical methods: Loomis and Streiner used data from northern California home sales and applied well-accepted and peer-reviewed empirical methods. The study was published in *Rivers*, a peer-reviewed academic journal. Colby and Wishart used data from Tucson, Arizona, home sales, applied sound empirical methods, and published an article of their results in *The Appraisal Journal*, a peer-reviewed journal of professional real estate appraisers.
- ♦ Market transaction prices on individual parcels or housing units are preferred to aggregated data such as census tract information: Loomis and Streiner used data from more than 1,000 individual property sales. Colby and Wishart included more than 7,000 single-family residential home sales in their analysis.
- ♦ Study context and policy context should have similar populations. The good, and the magnitude of change in that good, should be similar in study and policy context: The Streiner and Loomis study focused on the value of urban stream habitat improvements and the “bundles” of amenities they provide. In addition, the Colby and Wishart study addressed the value of property that is proximate to streams, arroyos, and washes in an urban area. Both sets of characteristics may be relevant to the SAS critical habitat, depending on the level of future conservation measures prescribed. The study context in terms of demographic characteristics and target populations are also similar: urbanized lands near or adjacent to streams and washes.
- ♦ The distribution of property rights should be similar: The Loomis and Streiner study focused on residential housing prices, which is also the focus of our application. The Colby and Wishart study also focused on residential housing prices. (For clarification, the relevant benefit measure for the policy context, and which is provided by both studies, is the marginal willingness to pay for the amenities.)
- ♦ Assessing the results of the empirical study should consider existing literature on hedonic methods as a valuable resource for comparing data, modeling assumptions, and results: The range of estimates in the Streiner and Loomis study were corroborated by a large body of peer-reviewed literature that we analyzed.

## **AMENITY VALUE ESTIMATION OF SAS CONSERVATION MEASURES**

As discussed above, habitat degradation such as loss of fish habitat, loss of open space and viewsheds, and deterioration of stream banks can result in reduced property values to property owners adjacent to these streams. Conversely, habitat designation and riparian conservation/restoration can generate benefits to property owners. The benefits of restoring a stream to its more natural state may include visual amenities, stable streambanks, flood control, and a more aesthetically pleasing viewshed (Streiner and Loomis 1995). For example, large stands of riparian trees and brush may support diverse populations of birds and other wildlife. Homeowners enjoy scenic views, open space, bird and wildlife viewing, and a buffer from urban noise. Riparian trees provide shade, giving respite from summer heat and lowering home cooling costs (Colby and Wishart 2002). While these benefits may be easily identifiable, they are

difficult to estimate in dollar terms. In this chapter, we estimate potential amenity values associated with SAS CHD based on the use of the best available information.

Among previous studies, only two studies (Streiner and Loomis 1995; Colby and Wishart 2002) to our knowledge directly estimate the effect of various stream restoration activities on property values. Specifically, Streiner and Loomis use the hedonic price method to measure residents' willingness to pay for various stream restoration activities in three northern California counties (Santa Cruz, Solano, and Contra Costa counties). They found that for activities such as establishing an educational trail, maintaining fish habitat, and acquiring land and easements along a stream ("Restoration Package A"), the one time increase in property value ranges from about \$15,570 (or 11 percent) to \$19,120 (or 13 percent) per single-family residence. For other practices, such as stabilizing streambanks and reducing flood damage ("Restoration Package B"), property values increase about \$4,480 (or three percent) to \$7,800 (or five percent) per single family residence. The analysis also included "packages" of improvements, which represented investments in bundles of riparian stream measures.

Colby and Wishart estimate the property value premium associated with proximity to riparian corridors in the southwest by analyzing thousands of residential home sales in the metropolitan Tucson, Arizona, area. They find that residential properties receive a premium of three to six percent if located within half a mile of riparian areas (streambeds, arroyos, and washes) proposed for protection, after accounting for the effect of lot size, home size, and other factors. Riparian areas generate a proportionally large premium (as a percentage of property value) for undeveloped land. The increased property value for vacant land arising from location closer to a riparian corridor ranges from 10 to 27 percent. Note that unlike the characteristics of this study, the designation of habitat may not result in the same type of protection.

The Streiner and Loomis study was concerned with stream *restoration* activities, while the Colby and Wishart study addressed *protected* riparian areas. In the case of the SAS CHD, the designation is assumed to provide protection that minimizes degradation of SAS habitat and reduces further degradation of SAS habitat such as might be associated with future development activities. This is accomplished by assuming that local ordinances similar to one established in Riverside County would be put into effect in those counties containing critical habitat.<sup>197</sup> The ordinance in Riverside County is designed to acquire land supporting protected species and mitigate the impacts of development on natural ecosystems. The cost of such a fee on development is treated in this analysis separately from the amenity value (see Section 5.0 for discussion of the costs on development). The presence of such ordinances, or similar regulations from the state, would provide additional protections from deterioration to the habitat (for example, vegetation planting and erosion control) for the SAS. Thus, we believe that, if such ordinances were adopted, a baseline comparison between a maintained versus a degraded habitat in the case of the SAS CHD is functionally equivalent to the Streiner and Loomis comparison of an unmanaged and a restored stream. We therefore apply the Streiner and Loomis study results to the SAS CHD.

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<sup>197</sup> Riverside County Ordinance 810.2, "Western Riverside County Multiple Species Habitat Conservation Plan Mitigation Fee Ordinance," <http://www.tlma.co.riverside.ca.us/ordinances/ord810.2.html>, accessed July 2004.

Table C-1 provides a summary comparison of the specific amenities that are addressed in the two studies and the applicability of the amenities to SAS critical habitat. The applicability is determined in part by consideration of the development fees by type (mitigation or management and monitoring) as modeled from the Riverside County ordinance discussed earlier. The development fees are discussed in Section 5.0 of the main report. As shown in the table, all of the amenities that are detailed in the Streiner and Loomis article except “education trail” are applicable and would be funded in part by development fees. The amenity measured in the Colby and Wishart article is the distance from riparian corridor for a protected stream, which is relevant to the properties within the proposed SAS critical habitat.

**Table C-1**  
**Benefit Transfer Studies, Amenities Measured, and**  
**Applicability to SAS Critical Habitat**

Studies and Amenities Measured	SAS Critical Habitat	
	Applicable?	Funded by Development Fees?
<u>Streiner and Loomis:</u>		
Maintaining fish habitat	Yes	Yes (monitoring and management)
Acquiring land	Yes	Yes (land purchase)
Education trail	No	No
Stabilize stream banks	Yes	Yes (conservation activities)
Reduce flood damage	Yes	Yes (conservation activities)
<u>Colby and Wishart</u>		
Distance from riparian corridor	Yes	No
Note: The relationships identified herein assume ordinances are adopted that include the relevant protections measures.		

## PROCEDURES

The following procedures and assumptions are used in the estimation of amenity value associated with the SAS conservation measures. First, we estimate the number of residential units located in low, medium and high density development areas in each habitat unit based on the following assumptions: 1) the number of residential units per acre in low-density areas is less than or equal to eight units, with an average of four units; 2) the number of residential units per acre in medium-density areas is between 8 and 14 units, with an average of 11 units per acre and 3) the number of residential units per acre in high-density areas is greater than 14 units, with an average of 20 units per acre. The low, medium, and high-density developments are defined based on the Western Riverside MSHCP.

Second, we estimated average housing prices by development density in each habitat unit using data from DataQuick.<sup>198</sup> The data contain the median new home price and the median new condominium price in 2003. We use the “condominium” price as the average home price for high-density development and use the median new home price as the average house price for medium density development. We estimated the average home price for low density development based on the average house price for medium density development and the effect of development density on housing prices reported by Wu, Adams, and Plantinga, who show that a one percent increase in development density reduces housing prices by 0.33 percent in Portland, Oregon. Based on this result, the average housing price for low-density development was estimated as \$441,000 across all potentially affected areas.

Third, we estimate the amenity value associated with the SAS conservation measures based on the best data available. As a first step, we must determine the percent of new housing units located in critical habitat that will be affected by the CHD. According to Colby and Wishart, all houses located within 1.5 miles of riparian corridors in metropolitan Tucson, Arizona, area receive an amenity premium. Streiner and Loomis report that all properties within one quarter mile of the stream corridor receive benefits, as well as a proportion of those properties located up to one half mile from the corridor. In the case of the SAS, the entire CHD and EL is located within 0.5 mile of the affected streams. However, to establish a lower bound of amenity values, we assume only up to a quarter of houses in the SAS critical habitat and excluded lands will be affected and then calculate the amenity values for different assumptions about the percentage of housing units affected (10 and 25 percent).

In the second step, we estimate the magnitude of applicable amenity values that an affected house will receive on average. According to Streiner and Loomis, property prices in areas of northern California with restored streams increased by \$4,500 to \$19,000 due to restoration measures. This amounts to 3 to 13 percent increases in property values. The value of the restoration package that includes land acquisition and recreation opportunities is particularly relevant for the SAS CHD. According to Streiner and Loomis, the value of this bundle of attributes adds approximately 12 percent to property values for affected properties. However, given that the CHD for SAS may not result in provision of the entire set of attributes in Restoration Package A to affected households, we use one half of this value as an upper bound for our assessment. This six percent assumption regarding the value of the amenities is also below the estimated values reported by Colby and Wishart for proximity of residences and land to riparian zones.

A scenario is also presented which affects the amenity premium for properties. It is not known with certainty whether the entire “riparian protection” amenity should be attributed to CHD and accompanying protective and conservation measures, such as those induced by local mitigation ordinances, or whether a portion would accrue even in the absence of CHD. For example, development may not take place directly in a river or within areas of frequent flooding, and some level of open space or visual amenity premiums

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<sup>198</sup> DataQuick, “Southern California Home Sale Activity, 2003,” <http://www.dqnews.com/ZIPLAT2003.shtm>, accessed July 2004.

may exist for lands adjacent to the river, regardless of CHD. However, additional amenity values would accrue with the presence of riparian conservation measures. To establish a lower bound on amenity values, we assume that only half, or three percent of the property value, is attributable to CHD.

## RESULTS FOR AMENITY VALUES

The estimated amenity values are reported in Table C-2. Using a three percent discount rate, the total amenity value for the CHD from 2004 to 2024 is estimated to be \$0.5 million dollars if we assume that only ten percent of houses in the SAS critical habitat will receive (lower bound) amenity premiums, and \$2.5 million if we assume that 25 percent of houses in the SAS CHD will receive (upper bound) amenity premiums. The total amenity values will be lower if a seven percent discount rate is assumed. The total amenity value for excluded land is estimated to be \$86,000 if we assume that only ten percent of houses in the SAS CHD will receive amenity premiums and \$428,000 if we assume that 25 percent of houses in the SAS CHD will receive amenity premiums. Among the four habitat units, Unit 1B, Santa Ana Wash, will receive the largest amount of amenity values, followed by Unit 1A, Northern Prado Basin, and Unit 3, Big Tujunga Creek. As noted earlier, Unit 1B contains the largest amount of developed land among the four habitat units currently and is projected to have the largest acres of new development.

The beneficiaries of the amenity values presented in this section are the owners of residential property and developed lots within the habitat units. As noted earlier, whether land developers and owners of undeveloped land also capture these benefits is a function of the ability of such agents to capture the price premiums from the amenities. There are additional, but unmeasured, amenity values that may accrue to owners of developed property that is proximate to the CHD, or to other individuals. These other amenity values are not included in this analysis.

**Table C-2**  
**Estimated Amenity Values from the Conservation Measures, 2004-2024**

Habitat Unit	Retrospective (Total)	Prospective (Total)		Prospective Annual <sup>a/</sup>
		3%	7%	
Unit 1A – Northern Prado Basin	\$0	\$185,000- \$927,000	\$143,000- \$717,000	\$12,000- \$58,000
Unit 1B – Santa Ana Wash	\$0	\$210,000- \$1,051,000	\$162,000- \$812,000	\$13,000- \$66,000
Unit 2 – San Gabriel River	\$0	\$0	\$0	\$0
Unit 3 – Big Tujunga Creek	\$0	\$102,000-	\$82,000-	\$6,000-

		\$510,000	\$408,000	\$31,000
<b>Total CHD</b>	<b>\$0</b>	<b>\$498,000- \$2,488,000</b>	<b>\$387,000- \$1,936,000</b>	<b>\$31,000- \$156,000</b>
Excluded Land (Essential Habitat)	\$0	\$86,000- \$428,000	\$66,000- \$332,000	\$5,000- \$27,000

a/ Annual costs are estimated by considering the average annual growth rate over the period 2004 to 2024. This is used as the basis for estimating the prospective annual cost. This is in contrast to the prospective costs, which consider the growth rates as forecasted by the California Department of Finance, which vary by ten-year periods.

Note: Numbers may not sum due to rounding.

**APPENDIX D:  
LIST OF ACRONYMS**

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ANF	Angeles National Forest
BLM	Bureau of Land Management
CEQA	California Environmental Quality Act
CWA	Clean Water Act
CHD	Critical Habitat Designation
CUA	Concentrated Use Area
DPS	Distinct Population Segment
EPA	Environmental Protection Agency
ESA	Endangered Species Act of 1973
FMO	Foraging, Migrating, and Overwintering
FMP	Forest Management Plan
HUC	Hydrologic Unit Code
LADPW	Los Angeles County Department of Public Works
NF	National Forest
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
OCSD	Orange County Sanitation District
OCFD	Orange County Flood Control District
OMB	Office of Management and Budget
RIX	Rapid Infiltration and Extraction
RCFC	Riverside County Flood Control and Water Conservation District
RFA	Regulatory Flexibility Act
SAS	Santa Ana Sucker
SARI	Santa Ana Regional Interceptor

SBNF	San Bernardino National Forest
SBCFCD	San Bernardino County Flood Control District
SBVMWD	San Bernardino Valley Municipal Water District
SCAG	Southern California Association of Governments
SMARA	Surface Mining and Reclamation Act of 1975
USBR	U.S. Bureau of Reclamation
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
USACE	U.S. Army Corps of Engineers